THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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IRON AND STEEL

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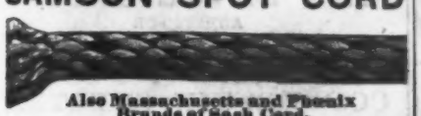

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(Signed) LIEUT. ALBERT S. JONES,
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selected after exhaustive trials, by the entire American Team in preference to all others, for their wonderful uniformity and extreme accuracy.

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CAHALL BOILERS See Page 128.

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NONE BETTER, as it makes joint instantly and will last as long as the metals which hold it.

NONE CHEAPER, as it weighs less than many others sold at equal price per pound.

Remember, all genuine stamped with Trade-Mark.

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"Swedoh" Cold Rolled Steel is unexcelled for Drawing and Stamping

THE AMERICAN TUBE & STAMPING COMPANY
(Water and Rail Delivery) BRIDGEPORT, CONN.

SEE PAGE 28.

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Best Anti-Friction Metal for all Machinery Bearings.

Fac-Simile of Bar. Beware of Imitations.

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Lamp Goods of all Kinds.
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Guaranteed.
R. A. HART. BATTLE CREEK, MICH.

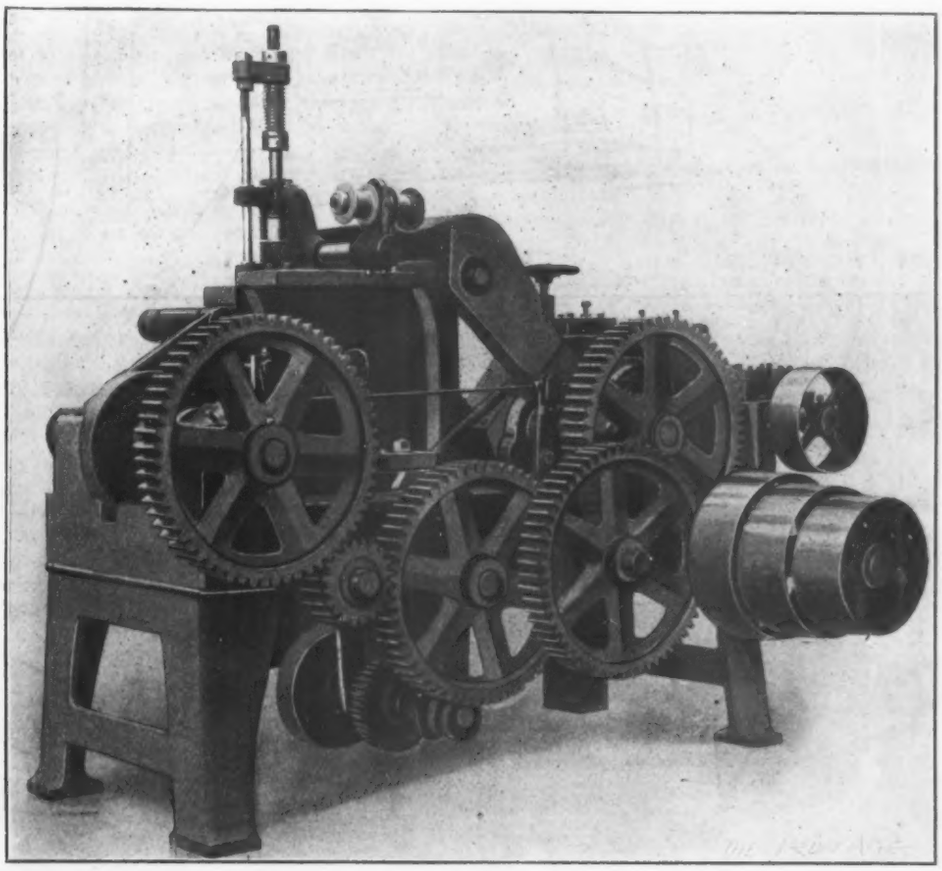
THE IRON AGE

THURSDAY, SEPTEMBER 17, 1903.

The Shuster Automatic Cotter Pin Machine.

The F. B. Shuster Company of New Haven, Conn., have introduced many improvements in their automatic machines for manufacturing split keys and round and flat cotter pins.

In designing this machine the endeavor was to obtain a complete exposure of all its principal working parts in order that the tools might be readily adjusted without any obstruction. The machine here illustrated will form round keys of from ⅜ to ⅝ inch in diameter, and flat keys not exceeding 1½ inches in diameter. Pins of either description can be formed from 1½ to 7 inches in length. The three-step cone permits regulating the speed in proportion to the length of the pin to be formed. The following contains a more detailed account of the main parts of the machine:



Rear View.

THE SHUSTER AUTOMATIC COTTER PIN MACHINE.

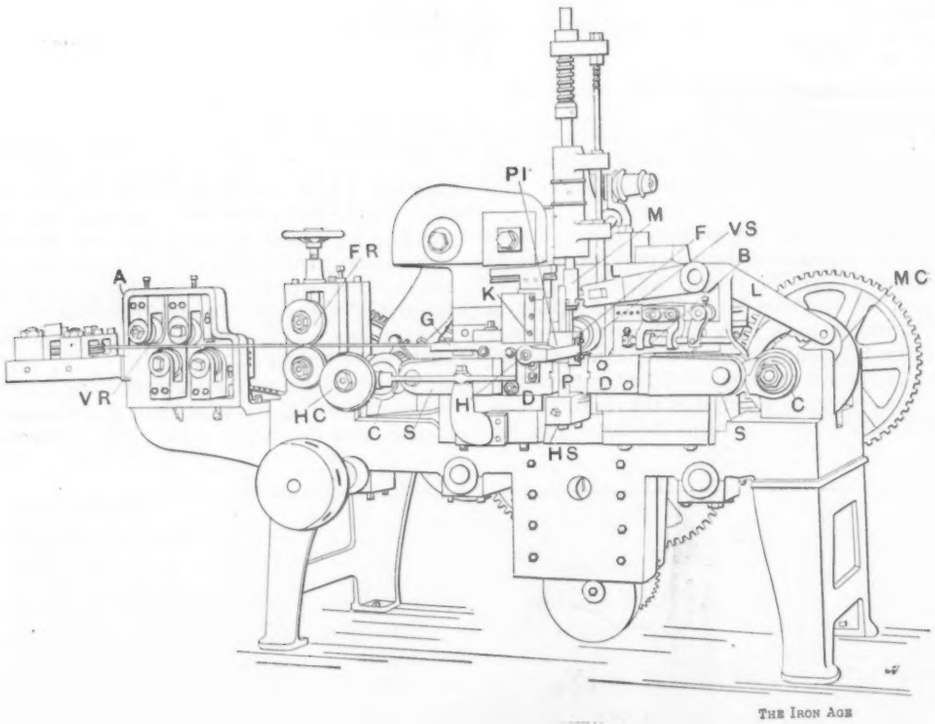
The vertical rolls V R of the roll straightener A are geared together and driven by a chain from the lower feed roll shaft. The feed rolls are indicated at F R. On the lower roll shaft is a friction clutch, which is released automatically, thereby stopping the feed during the formation of the cotter pin. The guide G lines up the wire to pass directly under the cut off knife K and into the groove in the forming dies D D. These dies are secured to slides S S that are actuated by cams C C on the side shafts. The former or breaking down tool is only indicated at F, since it cannot be seen on account of part of the stripping mechanism being in front. It projects to the front from a sleeve in the vertical slide V S and also to the rear of this slide and engages in a vertically slotted angle piece secured to the slide H S, which moves in a horizontal plane but at right angles to the slides S S. The vertical adjustable post P is supported in the end of the horizontal slide H S and carries the pin P^1, around which the eye of the cotter pin is formed in the dies. This pin is also hidden from view by part of the stripping mechanism. The adjustable stop gauge B is connected with the friction clutch on the lower feed roll shaft and releases that clutch when the wire has been fed into the machine to the proper length. The milling head M bevels the end of the cotter pin and is actuated by the cam M C and the levers L L. The stripping mechanism H is operated by the cam H C.

The operation of the machine is as follows: The wire passes through the straightener A, feed rolls F R, guide G, then over the dies D D and under the former or breaking down tool F until it strikes the stop gauge B. This releases the friction clutch, stops the feed rolls and immediately the wire is cut off at K, after which the former F is carried down between the dies and bends the wire into a U shape. The horizontal slide H S then moves to the rear, withdrawing the former F from the U shape and inserting the pin p' into the place vacated by the former. The side slides S S then move forward toward the center, squeezing the free ends of the U together, thus forming the eye of the cotter pin around the pin p'. The cotter pin is held in this position until the milling head M descends and mills the bevel on the end of the cotter pin for which the dies open and the stripper H removes the cotter pin from between the dies and strips it from the pin p'. When the cotter pin is removed from the dies the friction clutch is automatically thrown into operation and starts the feed for the next cotter pin.

Electric Furnaces for Tool Steel.

From a report published by *Electrochemical Industry* of the proceedings at the June meeting of the International Congress for Applied Chemistry, the following extract is taken from a paper by Dr. H. Goldschmidt of Germany on the manufacture of iron and steel in the electric furnace:

Crucible steel of best quality is obtained according to the method of Kjellin, a Swede. The furnace forms a transformer, in which the fluid steel takes up the low voltage secondary current with high current density, while a high pressure alternating current is led to the primary. This method avoids the use of electrodes entirely, and is purely a smelting operation, in which pure cast iron (about 25 per cent.) and wrought iron are smelted together. The first may advantageously be brought into the hearth in fluid form. In its essential points this method has been worked out in the Gysinge Iron Works and appears, as also does the method of Herroult of La Praz, France, to be technically quite satisfactory. An attempt is made to estimate the cost from



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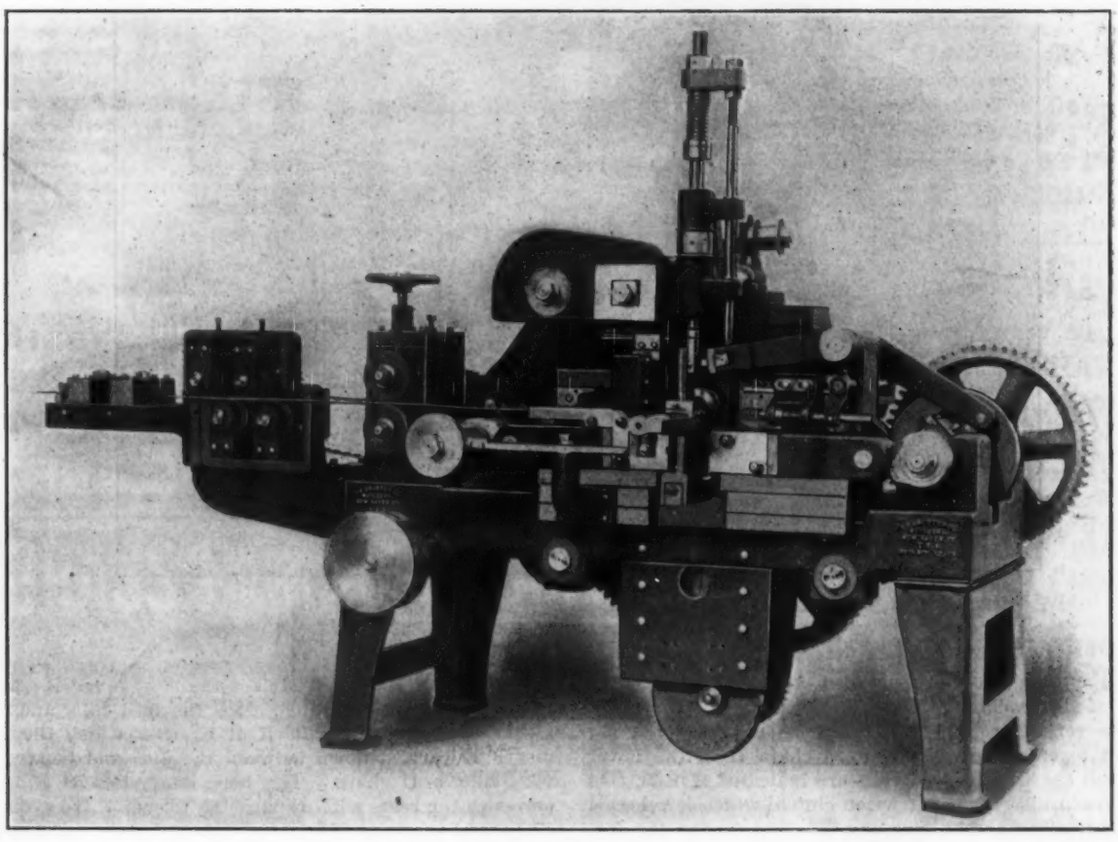


Front View.

THE SHUSTER AUTOMATIC COTTER PIN MACHINE.

data obtained in actual practice, by Kjellin's method, as follows:

Four thousand one hundred kg. steel are produced in 24 hours with 225 horse-power (165 kw.), hence 1000 kg. require 1320 horse-power hours.

Power (the cost of 1 horse-power-hour being assumed as 0.375 cent), in round numbers	$5.00
Charge	32.50
Mold	.25
Repairs and brick work	2.08
Depreciation and interest	.56
Wages	2.50
Total, without cost of business management, license, &c.	$42.89

The cost of the charge (pure charcoal pig iron and soft iron) is taken as $32.50 per ton. A charge of specially pure materials or the addition of chromium, wolfram or molybdenum would naturally raise this item of cost considerably. The charges for repairs and brick work appear very small; indeed, it is said that these would be even less if fluid cast iron and a larger furnace were employed.

A great advantage of the process seems to be in the fact that the fire gases do not come in contact with the steel, not even by diffusion. This being so, a lining of silica or magnesia stone can be employed, and finally large charges can be heated at once. The ordinary steel crucibles hold generally only 30 kg., and at most 50 kg. metal, while with the furnace at Gysinge about 1 ton can be worked. The cost of erection of a furnace, with capacity as given in the table and including electrical plant, but not source of power, is given as 15,000 crowns, Swedish. The following analyses made at Gysinge illustrate the composition of various steels thus prepared:

	I.	II.	III.
Carbon	1.45	1.20	0.95
Silicon	0.47	0.74	0.35
Manganese	0.49	0.46	0.33
Phosphorus	0.011	0.013	0.014
Sulphur	0.010	0.010	0.015

In the discussion which followed Doctor Goldschmidt said that the high figures of cost refer to cold charges.

In the same journal Dr. P. L. T. Heroult, La Praz, France, inventor of an electric steel process now in commercial use, describes his experiments. He says he has for the present laid aside his process for producing metal electrically from ore as "being more interesting for mine and hydraulic power owners" than for his company. He has since devoted his time to a steel process by which he produces a high quality of tool steel from scrap or pig iron. Regarding this process he says:

"A charge of scrap iron, mixed or not mixed, with pig, is melted either in the steel furnace itself or poured into it in the molten state from a ladle or from the fore hearth of a Wellman furnace or from a converter, the principal condition being that the molten metal should be suroxidized or overblown and free from slag. It is then covered with an artificial slag and submitted to the action of the current, which has no other object but to heat it up without any intervention of flame or oxidizing agent of any kind. This enables me, by pouring out the first slag and charging new fluxes, to wash out all the impurities of the metal. By adding carbon and other ingredients a perfect deoxidation is obtained, and as a matter of fact, the steel made by this process holds the record for purity. Perfectly deoxidized, traces of phosphorus and sulphur, all other elements at will, or to order, as one might say, and all this made out of the most common kind of raw material. This is the result of the process in its present form.

"I may add that outside of trials there have been made at this date about 1500 tons, of which 300 tons were produced in Sweden by the Aktiebolaget Héroults Elektriska Stal. This metal is tool steel, equal in quality to the best grade of crucible steel, and sold as such. The process is going to be applied to a large Thomas works, where electricity will be produced by a blast furnace gas engine. The output of electrically treated metal is, in France, 6 to 7 tons a day, working on cold scrap; in Sweden, about the same, and with the Thomas combination it will reach 150 tons every 24 hours with one furnace, 5-ton heat, using 600 horse-power. The consumption of electrodes is insignificant."

The electrodes which Heroult used do not dip into the molten metal and are no electrodes in the ordinary electrochemical sense, being only the terminals of the circuit from which arcs jump over to the molten metal.

The American Smelting & Refining Company.

The annual meeting of the stockholders of the American Smelting & Refining Company was held on September 9, when the annual report was submitted, and, in addition to the election of the retiring Board of Directors, two new directors were elected, namely, Edgar I. Newhouse and Edward Bush.

The report, which is for the fiscal year ended April 30, shows as follows:

	1903.	1902.	Increase.
Earnings	$9,403,711	$7,038,682	$2,365,029
Deduct—			
Ordinary repairs and betterments	770,854	791,306	*20,452
Interest, taxes and general expenses	1,056,071	1,385,757	*329,686
Totals	$1,826,925	$2,177,063	*$350,138
Net earnings	$7,576,786	$4,861,619	$2,715,167
Less appropriation for extraordinary improvements and for metal stock account	2,155,683	1,300,000	855,683
Balance, net income	$5,421,103	$3,561,619	$1,859,484
Preferred stock dividends paid, 7 per cent.	3,500,000	3,500,000	.....
Surplus	$1,921,103	$61,619	$1,859,484
Previous surplus	2,951,968	2,890,349	61,619
Total surplus	$4,873,071	$2,951,968	$1,921,103

* Decrease.

The balance sheet as of April 30 makes the following exhibit:

	1903.	1902.	Increase.
Assets.			
Property	$86,845,671	$85,869,037	$976,634
Investments	1,028,597	.....	1,028,597
Metal stocks	18,010,687	20,883,605	*2,872,918
Material, fuel and flux	1,107,253	957,878	149,375
Cash	2,339,154	992,013	1,347,141
Totals	$109,331,362	$108,702,533	$628,829
Liabilities.			
Capital	$100,000,000	$100,000,000	.....
Bonds	965,000	995,000	*$30,000
Net current liabilities	1,177,760	4,755,565	*3,577,805
Unearned treatment charges	2,315,531	.....	2,315,531
Profit and loss surplus	4,873,071	2,951,968	1,921,103
Totals	$109,331,362	$108,702,533	$628,829

* Decrease.

President Edward W. Nash in his report says:

From the net earnings of the year $655,683 was appropriated for extraordinary expenses, leaving a balance of $6,921,103, which under ordinary circumstances would be applicable for dividends. From this balance, however, the sum of $1,500,000 was credited to metal stock account. The company do not speculate in metals, but this account was built up so as to absorb all fluctuations in market value of metals in process of treatment and leave the regular profits of the company, arising from the treatment charges on ore and bullion, unimpaired at all times.

At the close of the year there were in operation smelting plants with a capacity of 3,720,000 tons per annum, refining plants with a capacity of 340,000 tons of lead bullion and 36,000 tons of copper bullion per annum. There were held in reserve, ready to operate at a short notice in an emergency, smelting plants with a capacity of 650,000 tons per annum, and refining plants with a capacity of 125,000 tons of lead bullion per annum.

Gross receipts from the sale of metals and miscellaneous revenue for the year aggregated $83,089,278.

The Trades Union Congress at its session in Leicester, England, on September 10, adopted by a large majority the following resolution: "This congress declares that the time has arrived when the hours of labor should be limited to eight per day in all trades and occupations in the United Kingdom, and that this be made a test question at the next Parliamentary, London County Council and all municipal elections."

National Bureau of Standards.

Report on the Year's Progress.

WASHINGTON, D. C., September 8, 1903.—Director S W. Stratton of the National Bureau of Standards has transmitted his annual report for the fiscal year ending June 30, 1903, to the Secretary of the Treasury. It contains much matter of special importance to the manufacturing industries of the country. The scope of the work of the bureau has been greatly widened during the past year, and will be still further enlarged in the immediate future as the result of the completion during the present month of one of the principal laboratories for which Congress has heretofore made appropriation.

Special effort has been made by Director Stratton in developing the work of the Bureau to give it practical as well as scientific value, and to take up problems in thermometry, pyrometry, electricity, &c., of immediate importance to manufacturers. Although the facilities at the disposal of the bureau are as yet quite meager, it is an interesting fact that no less than 405 tests have been made during the past year for manufacturers in various lines, chiefly in the iron and steel and chemical industries. With regard to the verification of weights and measures for manufacturers, engineers, merchants, &c., the report says, in part:

Weights and Measures.

A bench standard for testing steel tapes was designed for the use of the sealer of weights and measures of the State of Massachusetts. The same plan will also be furnished to one of the leading tape manufacturers and will be used to establish a 100-foot standard in the new Government building at Chicago, Ill. These plans will also be followed in the construction of the bench standard to be installed in connection with the laboratories of the bureau.

Considerable progress has been made in designing a set of model weights and measures for the use of city and State inspectors. It is the purpose of the bureau to furnish such model sets or drawings of such sets to manufacturers, in order that inspectors and others desiring standards of the highest utility may be enabled to secure them.

The following is a brief summary of the comparisons of mass, length and capacity the bureau is prepared to undertake at present:

Standard bars up to 10 feet or 5 meters, leveling rods, finely graduated scales, metal tapes up to 300 feet and 100 meters, limit gauges.

Weights from 0.01 grain to 50 pounds, or from 0.1 milligram to 20 kilograms.

Capacity measures from 1 fluid ounce to 10 gallons, or from 1 cubic centimeter to 40 liters.

Hydrometers with scales corresponding to densities from 0.60 to 2.00.

Thermometry and Pyrometry.

The work in the field of temperature measurement during the past year has been chiefly directed toward the design, construction and purchase, when possible, of such apparatus as will enable the bureau to test all kinds of temperature measuring devices. On this point the report says:

For scientific work requiring the highest attainable accuracy in the measurement of temperatures in the interval 0 degrees to 100 degrees, this bureau is now in the possession of five Baudin thermometers of the highest perfection of workmanship, and eight Tonnelot thermometers, all of which have been carefully studied at the International Bureau of Weights and Measures, and thus serve to define the connection of the temperature scale used by this bureau with the international scale of temperature of the hydrogen gas thermometer. The bureau has further prepared specifications and is now having constructed by Richter of Berlin a number of primary standard mercurial thermometers that are to be carefully studied at and compared with the standards of the Physikalisch-Technische Reichsanstalt.

Specifications have been prepared and primary standard mercurial thermometers are now being constructed by Niehle of Berlin and by Baudin of Paris, for work in the interval 100 degrees to 550 degrees. The specially designed platinum resistance thermometers have been constructed by the Cambridge Scientific Instrument Company, and have just been received by this bureau. A special Wheatstone bridge resistance box has been designed for use with these platinum thermometers and is now nearly completed. The comparison baths for work in the interval 100 degrees to 550 degrees are now being designed and the necessary parts assembled, so that the bureau will be in a position in the course of several months to certify thermometers up to 550 degrees C.

For the testing of pyrometers in the interval 500 degrees to 1500 degrees C. much of the necessary apparatus is now in hand. As standards the bureau is in the possession of several platinum and platinum-rhodium thermo-couples, which have been compared with the standards of the Reichsanstalt, in addition to a number of thermo-couples from other sources, and as soon as these have been recalibrated and intercompared the bureau will be in a position to certify pyrometers for the public. The platinum thermometers will also serve as standards up to 1000 degrees C. For the testing of pyrometers the bureau has available several small gas furnaces, several electric furnaces with necessary regulating rheostats, two radiation pyrometers with an electrically heated "black body" for the calibration of radiation pyrometers, a specially designed potentiometer suitable for thermo-electric work, a Callendar recording pyrometer, &c. A very thorough digest of the most important work done in the field of high temperature measurement from 1830 to the present time has been prepared.

The bureau is at present prepared to certify clinical thermometers, mercurial thermometers in the interval —30 degrees C. (—22 degrees F.) to +100 degrees C. (212 degrees F.), and thermo-couples in the interval 0 degrees to 1500 degrees C. (2700 degrees F.).

Electrical Work.

The electrical work of the bureau during the year was divided into two parts, the first including the construction and verification of resistance standards and standards of electromotive force, the calibration of resistance boxes, Wheatstone bridges, potentiometers and other resistance apparatus, direct current measuring instruments, &c., and the second embracing the verification of photometric standards. This work has been divided into the following subjects: (1) Primary and secondary mercurial standards and resistance standards of precision; (2) resistance boxes; (3) standards of electromotive force; (4) ammeter and voltmeter testing, and verification of resistance standards for current measurement; (5) photometry. Says the report:

At present resistance measurements of the bureau are referred to a number of 1-ohm manganin standards, reverified from time to time at the Physikalisch-Technische Reichsanstalt, which are therefore known in terms of the primary mercurial standards of that institution. The construction of secondary mercurial standards is now under way.

The set of resistance standards of the bureau has now been completed and consists of ten 1-ohm coils, and four coils of each of the following denominations: 10, 100, 1000, 10,000, 100,000, 0.1, 0.01, 0.001 and 0.0001 ohms, together with two 2-ohm, three 3-ohm, two 5-ohm coils and two megohm boxes, so that there are on hand in most cases two reference standards and two working standards of the same denomination. Two 0.00001-ohm standards are under construction.

The materials for a new lot of standard cells have been purchased from a number of leading manufacturers. The cells are to be set up in the immediate future. Arrangements have been made with the Weston Electrical Instrument Company for the loan of a dozen cells of the portable type, to be used in determining the relation between the standard cells of the bureau and those of the English and German institutions.

A laboratory has been equipped for the calibration of direct current ammeters, voltmeters and wattmeters, and the verification of resistance standards for the measurement of very large currents. The present range is 600 amperes and 300 volts, but will be considerably extended in the near future. The resistance standard of lowest value of the bureau is 0.0001 ohm. Standards of considerably smaller resistance can, however, be accurately calibrated. The double bridge method is employed.

Facilities are now provided for the verification of resistance standards of precision and standard cells, the calibration of resistance boxes and other resistance apparatus, ammeters, voltmeters, wattmeters, watthour meters, the verification of resistance standards for current measurement, the determination of the electrical conductivity and the temperature coefficients of materials.

The second part of the electrical work has included the measurement of electrical inductances and capacities, and the testing of inductance coils and condensers, and the preparation for alternating current measurements of a wider range.

The bureau is now prepared to measure the capacity of condensers by various methods, expressing it in terms of the standards of the bureau, and to test condensers for leakage, absorption and temperature coefficient. The bureau is also prepared to measure inductances in terms of its standards, and will shortly be prepared to measure both inductances and capacities in absolute measure.

The calibration of alternating current voltmeters and ammeters will be begun in the near future, as well as the testing of alternating wattmeters and watthour meters, frequency indicators, phase indicators, and other alternating current apparatus.

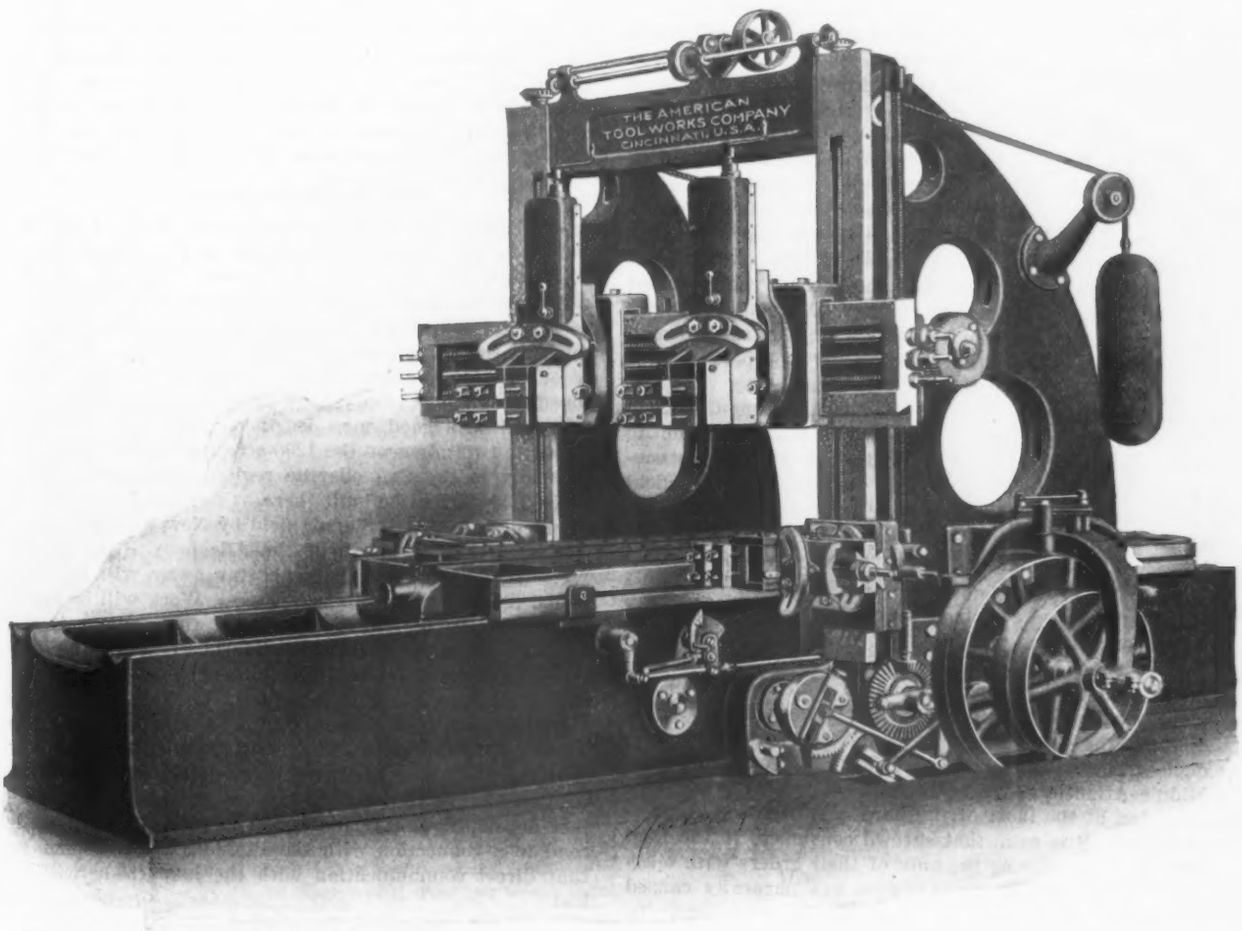
W. L. C.

On March 10, 1897, the power dam in the Genesee River at Mount Morris, N. Y., was swept away, and on September 10, 1903, six and a half years after the disaster the gates of a new power dam were closed and water was again turned into the raceway, from which several industrial establishments take their water for power supply purposes. The new dam is massive, and its construction is far superior to that of the dam that was carried away.

The New American Planer.

The American Tool Works Company of Cincinnati have lately redesigned their entire line of planers, 22 to 48 inches, with the purpose of adapting them to the greatly increased duty imposed by modern shop practice. Strength and rigidity have been foremost aims in the new designs. The bed accordingly has been made unusually heavy, extra wide between the V's, and thoroughly braced by heavy box cross girts at short intervals. The central portion, where the gears are mounted and the strain is heaviest, is strongly reinforced. The bed is of unusual length in proportion to the table, leaving but little overhang to the table when planing at full length. The table has ample thickness, and is provided with improved shifting mechanism, which removes the belt from one pulley before the return movement belt engages the other, thus obviating all disagreeable shrieking of belts. The reverse is without shock or jar, and the return is quick. A safety locking device prevents the table from starting before the operator is ready. The housings are double webbed cored section type, with wide bearings for the cross rail, and are fitted perfectly parallel with each other and square with the table. The cross rail has wide bearings for the heads, and is raised and lowered rapidly by power. The heads on the rail are made right and left to permit of planing close together. The saddles are graduated for angular planing. The feeds are automatic in all directions, and can be operated from either side of the machine, the down feed being of exceptional length, and equipped with micrometer adjustment. The side heads are of the compound slide type, giving the tool exceptional range of travel, are counterbalanced, and can be run below the level of the table when not in use. All pinions are of steel, all shafts are crucible steel of large diameter, and each shaft with all its parts can be readily removed when necessary without disturbing the rest of the machine. All gears are cut from the solid, are coarse pitch and wide face, and all gearing is located on the inside of the bed.

The planer here illustrated is the 42 x 48 inch.



THE NEW AMERICAN PLANER.

The American Electrochemical Society.

The fourth general meeting of the American Electrochemical Society opens in Niagara Falls September 17, to continue throughout Friday and Saturday. While this is a comparatively young association, its membership has steadily grown, the interests of many fields being merged. The programme for the meeting includes the following papers:

"A New Type of Electrolytic Cell," by P. G. Salom.

"Manufacture of Ferro Alloys in the Electric Furnace," by Dr. George P. Scholl.

"Electrolytic Copper Refining," by Dr. W. H. Walker.

"Some Theoretical Considerations of Resistance Furnaces," by F. A. J. FitzGerald.

"On the Supposed Electrolysis of Water Vapor," by F. Austin Lidbury.

"Efficiency of the Nickel Plating Tank," by Prof. O. W. Brown.

"Electrolysis of Sodium Hydroxide by Alternating Current," by Carl Hambuechen.

"A Practical Utilization of the Passive State of Iron," by Prof. C. F. Burgess.

"The Present Status of the Theory of Electrolytic Dissociation," by Dr. E. F. Roeber.

"Berthelot's Law of Electrochemical Action," by C. J. Reed.

Thursday and Friday afternoons will be devoted to seeing the industrial sights at Niagara. Thursday evening there will be a smoker, and on Friday evening a dance and reception. Saturday will be given to a trip to the mouth of the Niagara, where Fort Niagara and Niagara-on-the-Lake will be viewed.

Important Coal Trade Moves.

Preparations for Increased Production.

BY F. E. SAWARD.

Consolidations of Soft Coal Interests.

I doubt very much if there ever was a period in the history of the fuel trade of this country when it has attracted so much attention. The news of developments made and to be made are of daily occurrence, and the tendency toward a consolidation of interests continues. The two largest soft coal interests in Pennsylvania are to be worked in harmony, the tonnage from the Pittsburgh-Monongahela companies representing a very large percentage of the soft coal tonnage of the State of Pennsylvania and fully two-thirds of the output of the Pittsburgh district. Other consolidations of moment to consumers are also heard of.

New York and New England manufacturers ought to be interested in the consolidation of the Webster Coal & Coke Company and the Pennsylvania Coal & Coke Company. The new company will control some 80,000 acres of coal lands in Cambria, Blair and Indiana counties, on the main line and branches of the Pennsylvania Railroad. These lands are estimated to contain upward of 900,000,000 tons of soft coal available for shipment. The capacity of the combined mines is about 12,000 tons per day, which will be largely increased with the completion of the improvements now under way. The company are also interested in the production of coke, their present capacity being about 600,000 tons per annum. Contracts have been made whereby the New York Central Railroad will extend its lines into the company's properties, thus opening to the latter the markets reached by that system. The New York Central has purchased the Clearfield Southern road, which extends from Union Station to Boardman, a distance of 13 miles, and with which contem. The New York Central has purchased the Clearfield This road will be extended 15 miles further to Irvonia, from which point the Pennsylvania Railroad tracks will be used for a distance of about 20 miles to Amsbrey.

Trade of Coastwise Coal Carriers.

The coastwise coal trade out of Hampton Roads and other ports during the past month was highly satisfactory in every sense of the word, while the deep sea shipments measured up to the standard which was set some months ago. The Philippines, Mexico and the West Indies, on the Government's account, constituted the foreign cargoes. The coast movement was confined to the Middle Atlantic and New England States. The physical condition of the most of the hard coal carrying roads is so evident, it is said, that shrewd consumers in the East and West are placing the bulk of their orders with operators of bituminous mines. This has naturally caused an increase of business for coastwise coal carriers. In the Southern bituminous belt the average physical conditions of the roads are said to be good, which fact is enabling shippers to come nearer to supplying the demands made upon them by Northern buyers than would be the case were the railroads suffering from the same lack of facilities with which the hard coal carriers are said to be contending.

For this reason the following statistics will be of interest to the reader: The Southern Railway in six months carried 592,660 tons from Tennessee mines and 1,400,524 tons from Alabama mines, making a total of 1,993,184 tons, against 1,798,227 tons last year. The Norfolk & Western carried in its fiscal year, ending with June, 7,427,682 tons, against 6,523,500 tons last year. Its coke tonnage was 810,000 tons. The Chesapeake & Ohio Railroad carried in six months, ending with June, 2,680,435 tons of coal and 283,275 tons of coke. This is very little more than in the same period of last year, but it will show an improvement in the last half, owing to the strike at New River mines last season. The Baltimore & Ohio Railroad reports for the six months ending with June:

Grades.	1902. Tons.	1903. Tons.
Bituminous coal	8,439,268	8,668,160
Anthracite coal	409,466	535,433
Coke	1,863,207	2,125,710
Totals	10,711,941	11,329,303

Baltimore & Ohio Improvements.

Lorain is to be the largest ore and coal port of the Baltimore & Ohio Railroad on Lake Erie. Over $1,000,000 will be spent in enlarging the dock facilities and making the most complete individual lake terminal between Buffalo and Chicago. It will be the main coal shipping port on the entire Baltimore & Ohio system. Contracts were awarded recently to the Standard Contracting Company, Cleveland, for the 700 feet of dock at $50,000. The Baltimore & Ohio Railroad owns a frontage of two miles on Black River, and almost all of this will be used in building the most modern docks in the world. Along the 700 feet to be built by the Cleveland firm a $100,000 dock will be built at once for the handling of coal.

Since acquiring the Cleveland, Lorain & Wheeling, the lake terminal of which is at Lorain, the Baltimore & Ohio has been aiming to get a more direct route from the West Virginia and Southern Ohio coal fields to the Northwest, via Lake Erie. To carry out the idea, the Cleveland, Lorain & Wheeling is being double tracked and the grades and curves are being eliminated or reduced. This work will be completed within a short time, and, with a new line from Allegheny to Akron, much of the coal tonnage of the Pittsburgh district will be taken to Lorain.

The Indianola Field.

Coal has been reached in the initial shaft in the big Indianola field of the National Coal & Coke Company of Pittsburgh, Pa., and plans have been approved by the directors for the steel tipple which is to be erected at once. The vein was found to be 8 feet thick—especially thick at the point where the shaft was sunk. The coal is of splendid quality, and samples which have been coked show that as a coking proposition the Indianola field will be a good one. Engineers were also sent out to locate two mines on the 1200-acre tract of the National Company in the Connellsville region. Two coke plants of 1000 ovens will be built there. Coal will be ready for shipment from the Indianola field by New Year's day.

The first shaft north of the Allegheny River is 190 feet deep. A second shaft not far away will be completed to the coal within two weeks. Work will be started at once on the construction of a three-mile railroad from the Allegheny River at Harmarville to the two mines. This will cost $100,000, and the engineers believe that it can be finished by December. Each mine will have a capacity of 2000 tons a day, and shipments will be made to Pittsburgh for the local consumption east out over the West Penn, and west to the lakes over the same road. It is the intention as soon as the property is further developed to extend the Allegheny & Western Railroad to a connection with the Pittsburgh & Western, so that direct communication with the lake trade will be had.

Statistics Showing Growth.

The Pennsylvania Railroad is the largest coal carrier in the United States, and its business for 30 weeks shows up as follows:

Grades.	1902. Tons.	1903. Tons.
Anthracite	1,612,659	2,691,381
Bituminous	14,968,183	16,031,751
Coke	5,725,068	5,821,557
Totals	22,305,910	24,544,692

The Connellsville coking coal district is the most important source of supply of fuel for the blast furnaces of this country. It presents the following figures for 30 weeks, clearly showing the use of large cars in the service:

1901	320,585 cars or 6,714,091 tons
1902	341,288 cars or 6,855,628 tons
1903	331,332 cars or 7,428,531 tons

Southern Developments.

There is a great deal of development work going on in the southwestern corner of Virginia, and some very good seams of coal are to be worked there in the near future—one of 14 feet is spoken of. This fine, valuable, thick seam of coal underlies the Crab Orchard Valley, in Lee County. Coal experts, who have used a prospecting drill and drilled several hundred feet in this vicinity, declare this to be a fact. The main land owners in this territory

are the International Harvester Company, Chicago; the Virginia Coal & Iron Company, the Virginia Coal & Coke Company, the Imboden Coal & Coke Company, the Keystone Coal & Iron Company, the Interstate Investment Company of Louisville, Ky.; the Calvin-Pardee Company, Philadelphia; the Black Mountain Coal & Coke Company, Bristol, Tenn., with several other smaller companies. The Imboden Coal & Coke Company are now constructing a large coke plant and mining town on Pigeon Fork Creek. The railroad to the plant is nearly completed, and the Black Mountain Coal & Coke Company are preparing to establish a coke plant and mining town in the Pocket Valley.

The Central Iron & Coal Company of Alabama, who purchased ore mines at Giles from the Martin Mining Company about a year ago, have completed great improvements in developing the property and are beginning extensive operations. They have built a fine coal washer, erected new tipples and have also greatly improved the facilities for mining the rich deposit of red ore. Giles is located in Tuscaloosa County, near the line of Bibb, two miles north of Woodstock, on the Birmingham Mineral Railroad. It is one mile and a half west of the main line of the Alabama Great Southern Railroad, and a new line has just been completed by this company, which connects that place with the main line. With two railroads it has excellent shipping facilities. The entire production of this place will be used at the furnace of the Central Company near Tuscaloosa. The coal supply of this company is at Central City, seven miles northwest of Brookwood.

The coal business of the Louisville & Nashville Railroad with Mexico has grown so rapidly within the past year that the officers of the road have decided to add another steamer to their fleet. This is now being built, and will be ready for use about October 1. The Mexican coal trade of the Louisville & Nashville is a branch of their business about which little is known by the general public, although it is very profitable to the railroad company. It began several years ago, with one steamer, the "August Belmont." Since then two others steamers have been added, and all are kept busy. One steamer alone is used in filling the contract for the coal supply for the Mexican Central Railroad. This order requires 40,000 tons a month.

The United States Realty & Construction Company.

An example of the tribulations encountered by some of the more recent industrial consolidations is furnished in the case of the United States Realty & Construction Company. The underwriting syndicate who supplied the company with $11,000,000 in cash in exchange for $11,000,000 in preferred stock at par and a like amount of common stock have been dissolved. The syndicate managers, Hallgarten & Co., New York, sent out notices on September 11 to the participants in the underwriting that they would, upon the presentation of their certificates at the Central Realty, Bond & Trust Company, receive the stock and cash to which they were entitled.

The syndicate, it is said, have disposed of very little of the stock, and, in fact, the efforts of the managers to support the shares in the market have had the result that the subscribers are returned more preferred stock than that to which their subscription entitled them. A part of the common stock was sold, the proceeds from the sale of which presumably went into the additional preferred stock turned over and the small amount of cash which accompanied the stock.

According to a statement made in Wall street, the syndicate managers are returning for each $1000 in cash paid in, $702 in common stock, $1,155 in preferred stock and $61.66 in cash. At Friday's low prices, which were reached on a break presumably caused by the selling of syndicate members, the net result of the operation is a loss of $603.96 on every $1000 subscribed. It is asserted, however, that many subscribers are confident that the stock is intrinsically worth more than current quotations and are content to hold it until some more favorable time for selling. Friday's prices were $35¼ to $37 for the preferred and $6¼ to $6½ for the common.

While the list of syndicate subscribers was a fairly large one, it is said that several Wall Street houses had made large subscriptions. A prominent Western house are reported to have sustained a loss, figured at Friday's prices, of $2,000,000.

At the time of the formation of the company, about a year ago, the stock was brought out on the curb, where the preferred sold at $76 and the common around $38. At these prices there was an apparent profit for the syndicate of $140 per $1000, with the prospect that the continuance of prosperous business for the company would cause the price to advance. The stock has been subject not only to the adverse general market conditions, but also to the depressing influence of strikes in the building trades. A member of the underwriting syndicate says that while a certain loss would inevitably have come, in view of the severe slump in all securities, the seriousness of labor troubles in New York City had put this syndicate in a particularly unfortunate position.

The Thomas Iron Company's Annual Meeting.

The annual meeting of the stockholders of the Thomas Iron Company was held at Hokendauqua, Pa., September 8, 1903. Charles F. Chidsey of Easton, Pa., presided. The old Board of Directors was re-elected, as follows: Samuel Thomas, William H. Hulick, William P. Hardenbergh, B. F. Fackenthal, Jr., Fred. R. Drake, Joseph S. Rodenbough and J. Samuel Krause. After the election the board met for organization and re-elected the old officers, viz.: B. F. Fackenthal, Jr., president; William H. Hulick, vice-president, and James W. Weaver, secretary and treasurer.

The meeting was largely attended, and considerable interest was shown in the historical sketch of the company, presented by the president and included in his annual report. Reference was made to the fact that before the time for holding the next annual meeting the company will have been organized 50 years. It was on February 14, 1854, that the first meeting was held for organization, in Easton, Pa., at Mrs. White's hotel in Centre Square. This meeting was attended by 18 people; officers were appointed, and a charter was applied for, which was granted under date of April 4, 1854. There were 25 original stockholders, but one of whom is living—viz., Samuel Thomas of Catasauqua, Pa. It was decided to observe the semicentennial anniversary of the company with a jubilee celebration of all the stockholders of the company on or about April 4, 1904. The Thomas Iron Company have been in successful operation ever since their organization 50 years ago, and appear to be the only company manufacturing pig iron in the Lehigh Valley, or, in fact, doubtless in the entire country, that have continued in operation for so long a time without reorganization or having been absorbed by some other company, or having their original corporate name changed.

New German Customs Tariff.

United States Consul Joseph J. Langer, Solingen, Germany, makes the following report on German customs regulations:

The future handling of the new German customs tariff will place more responsibility on the importer than heretofore. The law provides that every importer must make an exact and specific declaration as to the goods to be imported, which will be strictly enforced. The only exception is made when the importer asserts that he is unable to make a reliable declaration, in which case, however, the clearing of such goods is delayed and any inspection on probation excluded.

The changes as to the new tariff consist chiefly in tariff rates themselves and the official invoice appertaining thereto. These being more specialized than heretofore, will necessitate a more detailed declaration as well, particularly as to textiles, hardware, machinery, &c. For instance, as to tin, the thickness must be given; in machinery, the kind must be specified and the weight of each machine given; in cotton goods, thread and relative weight must be specified. This will not only simplify the official inspection, but facilitate it as well.

Iron in Scotland and Cleveland.

Shipbuilding.

GLASGOW, September 3, 1903.—An enormous output of new ships in August would seem to indicate a larger measure of prosperity in the shipbuilding industry than actually prevails. The completion of so many vessels for launching within one month is, however, only an incident, and the dimension of the volume of completed work just leaves the builders with so much less on hand, as the new orders are far short of the tonnage of new vessels put into the water. From the Scotch shipyards the output in August was 34 vessels of 73,585 tons, a total which makes up for the short holiday output of July (17,315 tons), and which is largely in excess of the 46,880 tons put out in August, 1902. From Clyde yards the August output was 25 vessels of 69,078 tons, leaving 1630 tons to be furnished by the Forth, 1900 tons by the Tay and 1037 tons by Dee. In comparison with seven former years the Scotch output stands thus:

	August. Tons.	Eight months. Tons.
1903	73,585	299,341
1902	46,882	338,708
1901	55,080	354,826
1900	38,185	321,360
1899	41,350	319,710
1898	29,514	274,463
1897	33,832	210,362
1896	21,838	248,715

The new orders for ships booked in August do not amount to more than about half the amount of tonnage launched. They include liners for the Union Steamship Company of New Zealand, MacBrayne's Highland Line, the Asiatic Steamship Company, and for the Australian line of Huddart, Parker & Co., Melbourne, as well as a few cargo boats. But the most notable fact about the new business is that it includes two more turbine steamers, to be built by Denny of Dumbarton—one for the coasting service of the Union Steamship Company of New Zealand and another for the Irish service, between Larne and Stranraer. It is reported that the Canadian Pacific Railway Company are also negotiating here for turbine steamers for their Canadian lake service.

The Iron Market

Our pig iron warrant market has varied with the advices from your side, and latterly has been firmer, notwithstanding efforts on the part of the bears to depress. The quantity of iron changing hands, however, is limited, owing to an absence of sellers, as there have again been signs of operators in London interesting themselves in our market. The shipments of pig iron from the Tees continue heavy, and the quantity exported is now about 120,000 tons more this year than in the same period of last year. The increase in the shipments is largely caused by the good home trade, in which Scotland has participated to a large extent. A large business has been done among local consumers, especially in the foundry department, several buyers having covered their requirements for the next few months. The Scotch demand for Cleveland iron will probably be large for the remainder of the year.

In the Cleveland district makers are practically sold up for September, and are now holding out for fuller prices: No. 3 is nominally 47 shillings, No. 4 foundry 46 shillings 9 pence and No. 4 forge 45 shillings 6 pence per ton, f.o.b. Tees. There has been almost no business reported lately in West Coast hematite warrants, but quotations are rather firmer at 56 shillings 6 pence cash. Scotch and East Coast hematite are 61 shillings and 56 shillings 6 pence per ton delivered to the steel works in the respective districts. The advance in the bank rate this week has had a depressive effect on speculation.

A few days ago Wm. Baird & Co., Limited, advanced their quotations for all their special brands of pig iron by 1 shilling per ton. Other makers then raised their prices by 6 pence to 1 shilling per ton. Quotations for Scotch makers' iron are now, therefore, as under:

	s.	d.		s.	d.
Coltness, No. 1	72	6	Shotts, No. 1	66	6
Gartsherrie, No. 1	63	3	Carron, No. 1	67	0
Summerlee, No. 1	67	6	Clyde, No. 1	63	0
Calder, No. 1	63	0	Carnbroe, No. 1	56	6
Langloan, No. 1	70	6	Monkland, No. 1	56	0
Eglinton, No. 1	57	0	Glengarnock, No. 1	62	6
Dalmellington, No. 1	56	6			

The following shows the total stocks in public stores in the United Kingdom on the dates given:

August 28, 1903.—Tons.	December 31, 1902.—Tons.	November 30, 1900.—Tons.
164,684	171,795	126,294

Steel and manufactured iron at Middlesbrough are quiet and unaltered. Steel ship plates are £5 12s. 6p.; steel angles, £5 10s.; iron ship plates, £6 10s.; iron angles, £6 5s. less discount; steel rails, £5 5s. net. Before the rise in makers' new iron bar, makers had reduced their price for common bars 2 shillings 6 pence per ton; the price is now £6 10s. for common and £7 for best.

At Barrow-in-Furness, which is closely associated with the Clyde, there is a fairly steady home demand for hematite pig iron, but there is a disposition on the part of smelters to reduce the output by putting some of the furnaces out of blast. Smelters of iron, who are also makers of steel, are very well off for orders, but those who have to depend on the open market are not so well placed. The steel trade is busy on heavy rails, and makers are very well sold forward, the mills being employed night and day, prices for ordinary specifications being firm at £5 10s. per ton. Plates are not in full inquiry, and the mills will not long be kept as busily employed as they are at present. Ship plates are at £5 15s. A steady trade is done in other steel sorts, with the exception of heavy steel castings and hoops, which are quiet. Shipbuilders and marine engineers have less to do than for a considerable time past, and prospects of new business are not bright.

German billets are not competing quite so keenly in the northwest district, quotations being up to £4 8s. 9p. to £4 9s. 6p., with local quotations firm at £4 15 s. In structural steel there has been a fair amount of business doing, with a slight advance upon recent rates, and angle iron is now £5 12s. 6p. to £5 15s. In plates, prices both for tank and boiler making qualities continue irregular. In steel boiler plates, although the English Association basis remains at £7 2s. 6p., this is little more than a nominal figure, as association makers are allowed to sell certain specified quantities at lower figures, and £6 15s. has been taken on some lots, with outside makers selling in some instances at £6 12s. 6p. for boiler specifications. In the engineering trades the position outside one or two special sections remains unsatisfactory, some establishments being rather better off for orders, while in others there is a tendency to slacken off. The situation is not encouraging, and the outlook shows no indication of any general improvement.

Colorado Buys Utah Iron Ore Properties.

According to the Salt Lake City *Tribune*, the Colorado Fuel & Iron Company have made an important addition to their Utah holdings. On August 26 their purchasing agent paid over $90,000 to the Taylor estate for six iron claims in Iron County. The purchase puts the Colorado Fuel & Iron Company in possession of six-tenths of the known iron land in that section of the State. The property has been on the market for some time. A year ago an option was given to Messrs. Kimberly and Buhl for $250,000. Fifty thousand dollars was paid over, but the holders finally decided that they did not want the property.

The six claims are the Blowout, Excelsior, Black Magnetic, Chesapeake, Duncan and Desert Mound. The Blowout has the most iron in sight. It is estimated that from 1,500,000 to 2,000,000 tons are visible on the surface. The Excelsior is high on the mountain side and rather inaccessible. The Duncan is known to contain a very large body of soft hematite. The Desert Mount is also a hematite proposition and is very favorably situated for working, being easily accessible to a railroad.

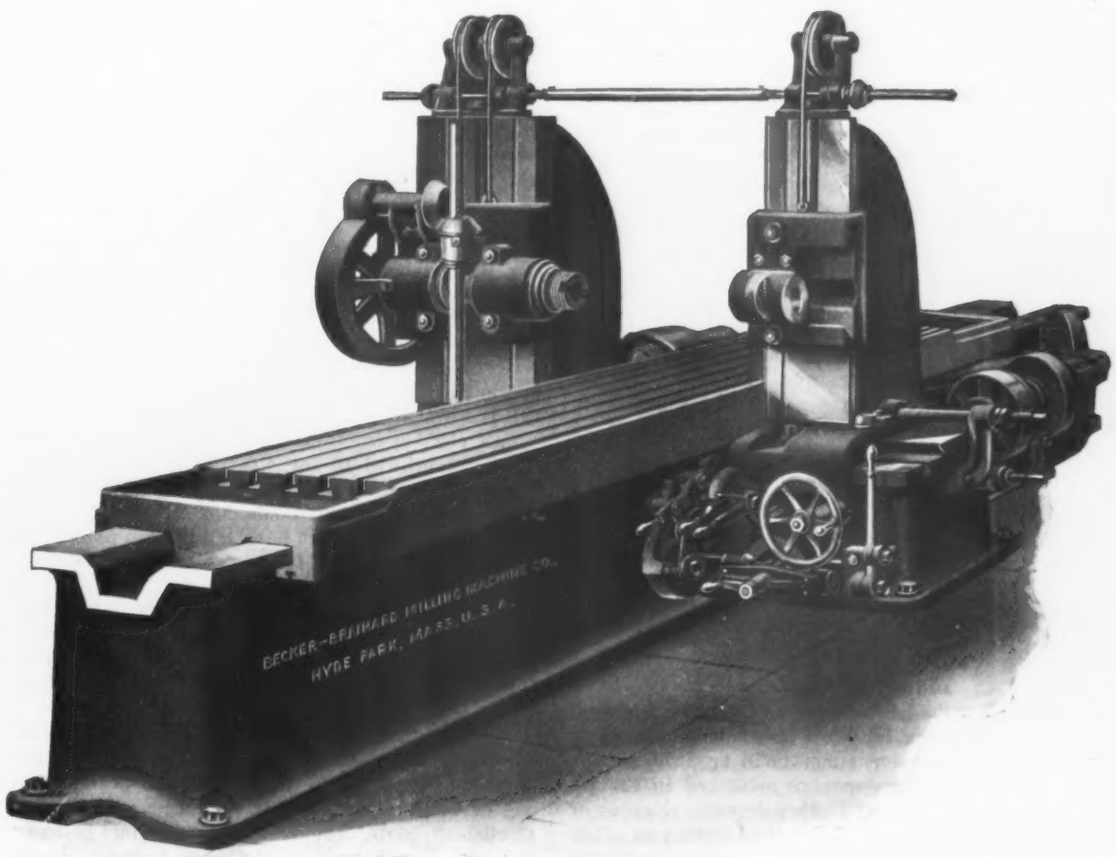
It is a foregone conclusion that the railroad will build to the mine as soon as the company are ready to begin operations, but when that time will come is problematical. There is no possibility of a local treatment plant. The company have no reason for building furnaces so far from headquarters. Another objection to a local iron smelter is the insufficiency of water and coal in the vicinity of the property.

The Becker-Brainard Planer Type Milling Machine.

The new 32 x 26 inch by 10-foot planer type milling machine, built by the Becker-Brainard Milling Machine Company, Jamaica Plain Station, Mass., is of very heavy construction. The spindle is of hammered crucible steel 5 inches in diameter, has a threaded nose and runs in self centering bronze boxes having nut and check nut to compensate for wear. The spindle carrier is of substantial design, and is held firmly to the upright by long gibs. It is elevated by a screw with adjustable dials graduated to thousandths of an inch, and has a counterbalance for ease of operation. There are 20 changes of speed for the cutter spindle, obtained by gearing in the main driving cone, operated by clutch and lever, so that all changes can be made instantly.

The table is regularly built with five T-slots lengthwise, and an oil channel the full length and at each end. It travels on flat ways, securely gibbed, and has a quick return operated by power from a separate countershaft. It can also be moved by the usual hand wheel. The feed of the table is directly operated through gearing from the spindle at ratios of 13½ and 27 to 1 by a 5-inch belt on a five-step cone. The largest step is 23 inches, and the smallest 13 inches, giving a range of feed through eight changes from 3-64 to ⅜ inch. These changes can be made instantly by means of a lever, without stopping the machine. The head can be adjusted in either direction from either side, so that it is not necessary to take the cutters off the arbor in order to change their position in relation to the work. The bed is braced by heavy cross girts, which are evenly spaced, and can be made any required length.

The working surface of the platen is 120 x 26 inches; the automatic longitudinal feed in both directions is 120 inches; the greatest distance from the center of the spindle to the table is 28 inches, and the least 2 inches. The greatest distance from the end of the spindle to the center of the tables is 16⅜ inches and the least 6¾ inches; the greatest distance from the end of the spindle to the tail stock spindle is 37 inches and the least 17 inches. The machine weighs 25,000 pounds.



THE BECKER-BRAINARD PLANER TYPE MILLING MACHINE.

British Workingmen's Conservatism.

Some months ago J. C. Stewart, an American contracting engineer of high reputation, erected the British Westinghouse shops in a twelvemonth, when no firm in England would undertake to do it in less than five years, the job being done upon American plans and systems. In order to succeed Mr. Stewart had to remodel English ideas as to what constituted a day's work, and, in spite of the obstacles placed in the way by trades unions, he tripled the number of bricks laid in a working day without any difficulty. A reasonable supposition would be that this example would serve as an object lesson and stimulate native contractors to adopt our methods, but so strong is conservatism in England that it did nothing of the kind, and the trades unions are endeavoring to prevent the adoption of American methods on other enterprises now going forward. This time the issue is upon the moment for resuming work. The contractors insist that the men shall commence work when the whistle blows, and to do this they must necessarily be on the scaffolds above; but the unionists declare that they must be on the ground and not commence to ascend the ladders until the whistle stops blowing. Rather than give any pretext for delaying the work the contractors agreed to this, but cut the wages one cent per hour, making the men lose the time in ascending the ladders instead of bearing it themselves, and that is the way the matter stands at present, the men losing ten cents a day for the privilege of adhering to a senseless custom.

The Cleveland Furnace Company have been producing Bessemer iron in their blast furnace at Cleveland, Ohio, but, beginning October 1, they will be in the market with an assortment of Scotch and strong foundry grades suitable for all classes of foundry work. They will also make malleable and Bessemer pig when required. Rogers, Brown & Co. are their selling agents.

Notes from Mexico.

Silver's Vagaries and Business.

DURANGO, September 10, 1903.—About the first of the month a sudden and steady rise in silver values, consequent upon the demand from India, the Philippine purchases and other influences, caused exchange rates on New York to fall to the lowest point reached in many months. The immediate result was the purchase of exchange in large volume by business houses for the settlement of foreign accounts. No little excitement was caused by the unexpected movement, and the usual hopes and fears alternated as to the future course of the variable metal. Only the most optimistic look for anything resembling stability in the value of the Mexican dollar under present conditions. The sudden and extreme rises are as detrimental to the even conduct of business as the declines, since both movements introduce something closely akin to the gambling element into affairs which should be entirely free from any such stimulus.

General business continues active. A report from the City of Mexico says: "Buyers from the interior are flocking into the city to renew the fall stocks of goods, for delivery immediately after the middle of September, when the heavy rains shall have about ceased. And many of these buyers bring their families from the interior to see the great celebrations of September 15 and 16, and these families spend considerable money in the shops. Hence business has been active, receipts over the counters good, old stocks diminished, and remittances larger than for some time, with silver higher and exchange lower."

One of the best indications of the country's prosperous condition is the general public indifference as to what value foreign nations trading upon the gold standard may place upon the Mexican peso. The people, other than the business community and a few students of finance, are utterly indifferent to the vagaries of exchange. Work is plentiful and their wants are few. They, of course, do not appreciate the fact—a serious one for Mexico—that a dollar which is periodically losing a fraction of its purchasing value, and never permanently recovering the lost value, notwithstanding spasmodic revivals from disastrous "slumps," is not a safe financial basis for a country so well entitled as Mexico is to stand abreast of the foremost trading nations.

Industrial Notes.

The Government has determined to establish a bureau of information in connection with its financial agency in London. The proposed department will keep on file for reference the principal newspapers published in the republic, maps, agricultural and other reports, samples of products, photographic views, statistical data, and other information likely to be of service to the increasing number of people interested in the development of the country.

An order has been placed in the United States for two more oil burning locomotives for the National Tehuantepec railway. The company have four engines of the class in service. It is asserted that three of the oil wells drilled in the vicinity of the railway are producing low grade crude petroleum.

The Mexican (Vera Cruz) Railway Company are about to place an order for a number of box and fuel cars. An order has been given the Crocker-Wheeler Company of Ampere, N. J., for equipment for the new electric light plant which is to be constructed in Torreon, Coahuila.

The American Carriage Works Company of the City of Mexico have gone into bankruptcy.

The Western Electric Company of New York, N. Y., have secured a contract for the telephone line which is to be established between the cities of Torreon and Monterey.

The Badger Mexican Planters' Company, who own a body of land near San Juan Evangelista, Vera Cruz, intend to erect a sugar mill of large capacity, for which orders will soon be placed.

Orders for placer mining machinery for exploiting mines in the district of Guanajuato are about to be placed on account of the Guanajuato River Power Company, the work being in charge of E. G. Spilsbury of the E. G. Spilsbury Engineering Company, 45 Broadway, New York City.

Luis K. Freese and J. K. Fernandez are about to build a large saw mill at Mesa de Gutierrez, Neuvo Leon, and will need equipment.

A project is on foot among the local land owners of Jiquilpam, Michoacan, for draining a large lake in that neighborhood, $200,000 having been pledged for the undertaking.

A leading supply house in the capital reports a brisk demand for typewriting machines, July being styled a banner month for sales.

There is a growing demand for automobiles in Mexico.

A large order for mining machinery will shortly be given by the Sonora Mining and Milling Company of Tubutano, Sonora.

A company whose specialty will be the manufacture of matches in block form for the Mexican and South American markets have lately been formed in Mexico City. The capital is $50,000, of which $25,000 has been paid in.

The mayor of Laredo, Texas, Amador Sanchez, is about to develop coal deposits near Colombia, Tamaulipas, of which he is the owner, and will require the necessary machinery and tools.

The Tampico Land, Lumber & Development Company are contemplating the erection of extensive saw mills for the production of lumber from the large body of timber lands which they own on the Panuco River, near Tampico.

The International Brakeshoe & Foundry Company of New York have made an arrangement whereby the Monterey Machine Works of Monterey, N. L., of which institution R. E. L. Meehan is president, will manufacture and sell the first named company's specialties in Mexico.

An electric traction system, eight miles in length, is to be established in the city of Aguas Calientes. The equipment will be furnished by the Western Electric Supply Company of St. Louis, Mo.

The following orders have lately been placed with the companies named, for Mexican shipment: Manning, Maxwell & Moore, New York, various machine tools; the Oil Well Supply Company of Pittsburgh, Pa., oil well machinery; the Morris Machine Works of Baldwinville, centrifugal pumping machinery; and the Loomis-Pettibone Gas Machinery Company of New York, gas engines for mines.

A prominent metal company of the United States with offices in the capital, change the wording of their announcements from time to time in the press. Recently, one of their advertisements read thus: "Tin plate, but English tin plate," the name of the product being printed in large capitals, and the qualifying words in smaller letters beneath. Doubt has been expressed as to whether the reflection upon the quality of the product turned out by United States tin plate mills is deserved.

The Pan-American Railway Company, whose concession covers the construction of a line from San Geronimo, on the Isthmus of Tehuantepec to the frontier of Guatemala, upon which work has been under way for a year or more, will soon place orders for locomotives and rolling stock.

The Kansas City, Mexico & Orient Railway Company have closed a contract with the American Car & Foundry Company of St. Louis, Mo., for 320 30-ton box cars, 100 30-ton combination coal and stock cars, 110 40-ton flat cars and six caboose cars, the contract price being over $500,000.

The Treasury Department has fixed the rate for the payment of duty upon imports for the current month at 224.10 per cent.

A company have been formed in the capital for the development of recently discovered coal deposits at Agostitlan, Michoacan. The capital stock is $750,000, of which $250,000 has been subscribed. The work of development is to be in charge of Carlos Stoffel and Arthur Pallandt. Much hope is entertained of the success of the enterprise, the coal upon analysis having proved to be of good quality.

A water power concession has been obtained by Fe-

cundo Perez, who is authorized to use 10,000 liters of water per second from the Santiago River, Jalisco. The concession recites the customary conditions as to time. A deposit of $5000 guarantees the fulfilment of the contract on the part of the concessionaire.

The expansion of the Mexican Central Railway system and the consequent increase in traffic are indicated by the large number of new locomotives which the company have ordered. The American Locomotive Company are building nearly 100 engines for this great Mexican railway. The orders placed include 71 locomotives of the consolidated type, 11 mogul passenger engines and seven switching engines. J. J. D.

Talks with Lawyers on the Labor Question.—III.

The United States courts and the courts of practically every State in the Union have condemned boycotts. The same courts have generally sanctioned picketing, so long as it is free from violence or flagrant intimidation. A boycott is an organized effort to prevent people from buying the goods of the party attacked. Picketing is an organized effort to prevent people from selling their labor to the party attacked. The motive in both cases is the same—to injure or destroy the business of the party attacked.

It would seem as though the courts have been inconsistent in dealing with these two phases of industrial warfare, but it is possible that the fault lies with employers rather than with the courts. On the one side we have had thorough and perfect organization, controlled by leaders who have shown themselves masters in the art of handling men and in influencing public opinion or sympathy. On the other side we have had, until recently, an utter lack of organization. Even now a majority of the organizations of employers have been following a policy of meeting force with force, instead of making an organized effort to secure obedience to the laws of the land. When employers have called upon the courts for protection against picketing they have usually acted in a sporadic manner, without taking the time or spending the money to prepare their "case" properly, and when they fail to get what they expected there has been too much of a disposition to criticise the courts and to assert that judges are afraid of the "labor vote."

Probably the most serious mistake that has been made in appeals to the courts is in having the employer appear as the plaintiff, instead of bringing the action in the names of the men who want to work and who need protection against organizations which seek to deprive them of their constitutional rights. There is a clearly defined instinctive feeling on the part of the people of this country that the rich are able to take care of themselves, and that it is the poor that need the protection of the laws. This feeling is one of the inherited instincts of the race, bred into us centuries ago by the oppressions of the feudal system. The employer who goes into court crying for justice because somebody is trying to persuade his men not to work for him is at a disadvantage. He is rich, and the injury that is done to him by picketing is so indefinite in its nature that the courts are loath to interfere.

The man who wants to work stands in a different position before the law. He is a poor man, compelled to work for his daily bread, and the very foundation of our system of government rests upon his right to work at any lawful occupation and in any place where he may choose to work or where he may be able to find employment. Theoretically, the employer has the same right to protection in employing whomsoever he pleases, but it is vastly more difficult for him to prove the injury of which he complains in a case of picketing. He would have to prove a conspiracy on the part of the union to injure his business before he could obtain an injunction to restrain peaceable picketing.

In an action brought by men who want to work and who seek protection from pickets, the question of vagrancy might be raised with startling results from a legal point of view. The laws generally define a vagrant as a man who is able to work but refuses to work. This seems to fit the man who goes on a strike.. We have heard a great deal from our modern shepherds of labor to the effect that the courts cannot compel a man to work; yet it is a fact that most of our States have laws which provide that when a man is able to work and refuses to work he can be sent to the workhouse or the municipal rock pile, where he is compelled to work. We are so strict about it that when a man is arrested for vagrancy and the offense is proved, he is sentenced summarily by the justice of the peace or police magistrate, without the right of trial by jury.

Our vagrancy laws rest upon the idea that a man who is able to work and refuses to work is a menace to the peace and good order of society. We do not wait for him to commit some crime. We assume that he is making a living in some unlawful manner, and send him to the workhouse without giving him the opportunity to escape the penalty through the sympathy of a jury.

Strikers who go on duty as pickets are men who are able to work and refuse to work, and who add to this offense by interfering with others who want to work. Strange to say, the writer is unable to find any record of a case against strikers or pickets under the vagrancy laws. It would be interesting to follow the attitude of the courts if the question is ever brought before them from this point of view. If the pickets are absolutely peaceful in their efforts they are not likely to do any harm. If, without actual violence, they make threats or use intimidating language, or if they merely use abusive language toward the workers, they would be liable for criminal conspiracy against the men who are working. If they use actual violence, as they do in practically all strikes, the case is even more clear. If they plead that they are not "vagrants" because they are paid by some organization for picket duty, they make the members of the union who authorized such payment liable for conspiracy. If there is a contract, with a definite time to run, between the employer and the man who wants to work, the case would be still more interesting for the pickets or others who interfere.

Launch of United States Cruiser "Maryland."—An attempt was made to launch the United States 15,000-ton armored cruiser "Maryland" at the yards of the Newport News Shipbuilding Company, Newport News, Va., on Saturday, September 13, but she stuck on the ways. More than 10,000 people witnessed the attempt. The "Maryland" is 502 feet on load water line; extreme breadth, 69 feet 6½ inches; trial displacement, 13,860 tons; mean draft at trial displacement, 24 feet 1 inch. Her armament will consist of four 8-inch guns mounted in pairs in two electrically controlled elliptically balanced turrets, one forward and one aft on the main deck; four 6-inch guns; on the gun deck a main broadside battery of ten 6-inch guns, five on each side. On the main deck forward and aft will also be located the 18 3-inch guns of the secondary battery. The engines will be of the cylindrical triple expansion type. The "Maryland" is a sister ship to the "Pennsylvania," "Colorado," "West Virginia," "California" and "South Dakota."

Drawback on Channel Steel.—The Treasury Department advises the Collector of Customs at New Orleans, La., that on the exportation of finished cross ties manufactured by Frank Davies from imported pieces of rough channel steel, to which plates and bolts of American iron are attached, a drawback will be allowed equal to the duties paid on the imported materials so used, less the legal deduction of 1 per cent., upon proper entry and identification of the exported materials.

Automobiles have been put to good use in the shape of peripatetic machine shops for army purposes. One so fitted contains machine tools of all kinds, also appliances for blacksmithing and metal work generally. Every exigency that is likely to arise can be met, even to farriery and repairs to harness and telegraph lines. A winch is affixed to the front end, so that if the machine or a big gun gets stuck in a bad place it can be hauled out speedily. The whole affair, with spare details on board, weighs about 10,000 pounds. It is driven by gasoline, and is geared to ten miles an hour as a maximum.

The Manufacture of Ethyl Alcohol from Wood.

The manufacture of ethyl alcohol from wood is one of the latest achievements of science. To realize the significance of this announcement, from a chemical standpoint, and to appreciate the importance of the discovery to the alcohol and lumber manufactring industries, it is only necessary to keep clearly in mind the distinction between ethyl or grain alcohol—as it is known in commerce—and methyl alcohol, or wood spirits.

Heretofore ethyl alcohol, C_2H_6O, has been manufactured in this country almost entirely from corn, and in European countries, especially in Germany, from beets and potatoes. The only alcohol that heretofore has been obtained from wood on a commercial basis has been methyl alcohol, CH_4O, as a by-product in the manufacture of charcoal by the retort process. Plants of this character have been installed at nearly all of the modernly equipped charcoal iron blast furnaces in the United States, acetate of lime and tar, with methyl alcohol, being the by-products secured.

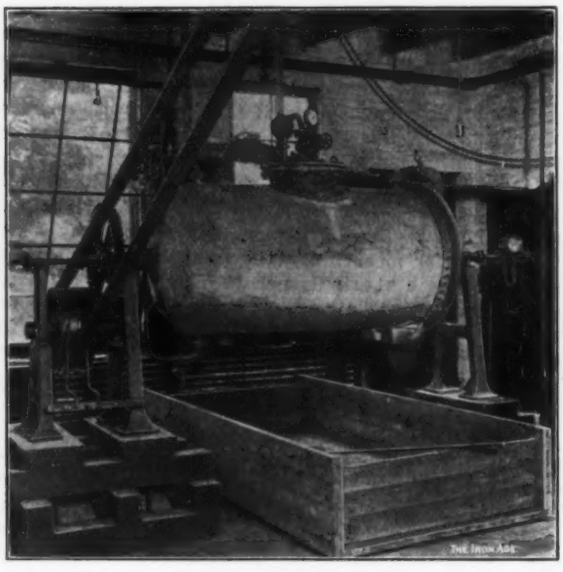


Fig. 1.—Rotary Digester.

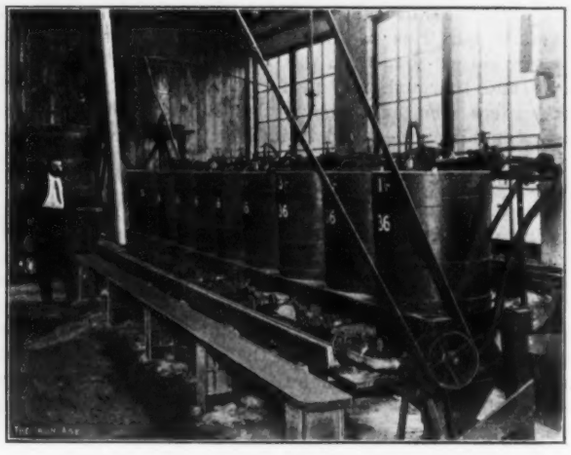


Fig. 2.—Exhaustion Battery.

THE MANUFACTURE OF ETHYL ALCOHOL FROM WOOD.

Methyl alcohol, or the present wood alcohol of commerce, is consumed principally in the arts, its physical properties rendering it unfit to be used as a basis for "blended goods," which are consumed as beverages. The muddy color, offensive odor and virulent toxic properties of methyl alcohol preclude it, even when rectified, from entering the wide commercial field open to ethyl alcohol.

From the theoretical standpoint, of course, it is and has been possible to make ethyl alcohol from wood, and it has been produced in the laboratory by a number of eminent chemists. But up to within the past year no method had been devised for the manufacture of ethyl alcohol from wood on a commercial basis, all laboratory processes being too expensive. It has been the conviction of chemists, however, that eventually the secret would be found.

Heretofore chemists who have worked along this line have used sulphuric acid to convert the cellulose in wood into sugar, but to neutralize the effects of, or to recover, the acid from the sugar solution has not been possible economically. In order to overcome this difficulty Alexand Classen of Aachen, Germany, conceived the idea of using sulphurous instead of sulphuric acid—sulphurous acid being a gas at ordinary temperature and pressure, and therefore more amenable to treatment. The result, it seems, has been the development of the Classen process for the successful manufacture, on an economical commercial basis, of ethyl alcohol from wood. Alexander Classen is an eminent chemist of Europe, professor of chemistry in the Aachen Polytechnic School, and a privy State counselor of the German Empire.

Source of Raw Material Supply.

How to dispose of saw mill refuse has been one of the most serious problems presented to manufacturing lumbermen for many years. In some mills the sawdust, with slabs, edgings and trimmings, is used as fuel under the boilers. But even so, the largest mills find difficulty in disposing of the waste product. There is a wide variation in the amount of this refuse, but at modern mills of large capacity it is estimated to be within 12 to 15 per cent. of the actual contents of the log.

Some lumbermen have actually constructed plants in which to burn or otherwise dispose of the sawdust. It will be seen from this that the refuse, which may now become a source of revenue, at the present day is a cause of annoyance and expense to the saw mills, and such is the magnitude of the mill industry that there is an abundance of material which may be utilized in the manufacture of alcohol for years and years to come. It is estimated that there are between 25,000 and 26,000 saw mills in the United States, varying in size, and each cutting from 5000 up to 600,000 feet of lumber per day, and that the waste is, on an average, 10 to 15 per cent. It is possible, therefore, to establish plants for the manufacture of alcohol from wood at mills where a supply of from 100 to 600 tons of the raw material may be obtained per day, it being estimated that 1000 feet of waste will weigh 1 ton. There is a single mill in Mississippi which cuts 600,000 feet per day and another 300,000 feet per day. Anther Southern company, running five to six mills, cut in the aggregate 500,000 feet daily.

Yield and Cost of Manufacture.

From the experiments which have been made in this country, on a semicommercial scale, it has been determined that one ton of wood of 2240 pounds will yield from 24½ to 27 gallons of absolute alcohol, or 49 to 54 proof gallons, at a cost of 13 cents per absolute gallon. With the perfecting of the process, and especially with the employment of improved mechanical methods, it is confidently expected that the cost will be reduced to 7 cents per absolute gallon. The cost of manufacturing alcohol from grain is estimated to be about 20 cents per absolute gallon, based upon corn at 30 cents per bushel. At present the cost is considerably more, as the market price of corn has risen to 50 cents and over. On the average 4¾ proof gallons of alcohol are obtained from a bushel of corn.

It has also been determined that the same quantity of alcohol is obtained from a ton of wood in this country as is obtained from a ton of potatoes in Germany, but the alcohol obtained from wood is said to be of much better

quality than that derived from potatoes. The cost of potatoes in Germany is from $6.50 to $8 per ton, while the cost of sawdust in the United States is but from 25 to 50 cents per ton.

Charcoal and Other By-Products.

One important feature in the manufacture of ethyl alcohol from wood by the Classen process is that after the cellulose has been converted into sugar and the sugar extracted from the wood the tailings may be pressed into briquettes without a binding agent, while wood alcohol, wood tar and acetate of lime may be obtained from the wood residue in the process of making charcoal, just as though no ethyl alcohol had been manufactured. This is especially important and interesting to charcoal blast furnaces, and may be worthy of special consideration. Experiments show that about 75 per cent. of the original weight of the wool may be converted into charcoal briquettes. The chemical composition of the charcoal thus produced is given by Otto Hehner, an eminent chemist of London, who has verified the figures made by Professor Classen, as follows: Carbon, 80 per cent.; hydrogen, 1.04 per cent.; nitrogen, 0.32 per cent.; oxygen, 8.34 per cent.; sulphur, 0.01 per cent.; moisture, 9.05 per cent.; ash, 0.47 per cent.

Experimental Plant at Highland Park, Illinois.

The Lignum Inversion Company, who have purchased the right to manufacture ethyl alcohol in the United States under the Classen patent, have established an experimental plant at Highland Park, near Chicago, which has been in operation about eight months. This plant, of which the essential features are shown in the accompanying illustrations, is necessarily crude from a mechanical and engineering standpoint, but, even with its inefficient machinery, results have been obtained which are highly satisfactory. For three months the factory at Highland Park was placed under the direct control of Dr. John H. Long, Professor of Chemistry in the Northwestern University, Chicago, and president of the American Chemical Association. In making his report at the end of this period Professor Long states that he made the tests rigid, to be certain that the product is really as good as grain alcohol, of which he had no question. In his report Professor Long states that the process is based on simple and thoroughly rational scientific principles, and has been well worked out by Professor Classen. He considers that the value of the process depends on three factors: 1, It is extremely simple in theory and operation. 2, The raw material used is cheap and abundant, and 3, it infringes on no previous patents, since the method is quite original with Classen. All previous attempts to obtain fermentable sugar from wood have been failures in practice.

The Process in Detail.

In the process of manufacturing ethyl alcohol from wood there are four stages: 1, The conversion of the cellulose in the wood into sugar. 2, The extraction of the sugar from the sawdust. 3, The fermentation of the sugar; and 4, the distillation of the alcohol.

The equipment consists of the necessary tanks and other apparatus for the manufacture of the sulphurous acid gas and the generation of steam; a tank in which the acid is under pressure; a rotary digester, in which the sawdust is treated with the combined acid and steam; an exhaustion battery for the extraction of the sugar from the sawdust; tubs in which the fermentation is carried on, and last, an ordinary still. The sugar solution is passed through the exhaustion battery by means of a rotary pump. The simple machinery is driven by means of a 4½ horse-power steam engine.

The labor cost is light, as but two men are required throughout the entire process, one being the chemist and the other an unskilled laborer. It should be remembered, however, that the distillation process, as in all other cases where alcohol is manufactured, is necessarily under government supervision, the manufacturers, of course, bearing the expense incurred through the internal revenue department.

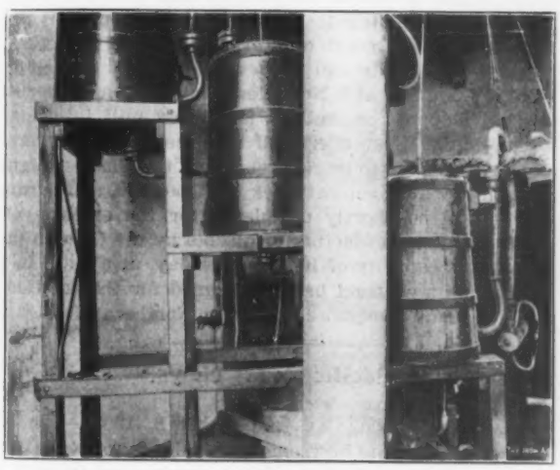


Fig. 3.—Acid Room and Apparatus.

Fig. 4.—Fermentation Room.

THE MANUFACTURE OF ETHYL ALCOHOL FROM WOOD.

The sawdust which is to be treated is placed in a lead lined iron cylinder, Fig. 1, called the digester, capable of revolving upon its axis. The cylinder is surrounded by a steam jacket for the application of heat. The sawdust is moistened with a 3 per cent. solution of sulphurous acid, one-third the weight of the wood, the acid and steam being introduced through pipes conveyed from the acid room. The temperature is raised to about 145 degrees C. under a pressure of about 100 pounds to the square inch, and the digester slowly revolved. As the temperature is raised the gas is liberated from the steam and penetrates the wood, converting the cellulose into sugar. At the expiration of about 90 minutes the process is complete, when fully 85 per cent. of the sulphurous acid is recovered with the exhaust steam. By this treatment the sawdust shrinks to about two-thirds of its original bulk and presents a nearly dry mass, having the appearance of coarse ground roasted coffee. The contents of the digester are discharged into a receptacle beneath the cylinder, and subsequently conveyed to the exhaustion battery, Fig. 2, in which the sugar is washed from the sawdust.

The exhaustion battery consists of a series of tubs or vats, each vat at the experimental plant having a capacity of 36 gallons. Of course these batteries are capable of indefinite extension, and in the commercial plant, which will soon be erected, capacity will be provided to treat all the sawdust which comes from the digester, the

capacity of the batteries to be proportioned to the contents of the disgester. The vats are connected by pipes, which are controlled by valves, and the contents are pumped from one vat to another as the process proceeds, care being taken to bring the sawdust richest in sugar in contact with the strongest solution, whereas the sawdust which is nearly exhausted of its sugar is treated with pure water. When the vats have been treated with ten washings they are emptied, refilled and the process repeated. From 450 to 500 pounds of sugar are thus obtained from a ton of sawdust, and from 70 to 80 per cent. of this sugar is capable of alcoholic fermentation, the remainder being pentose, which is nonfermentable.

The sugar solution is pumped from the exhaustion battery into a receiving tank, Fig. 3, where the acid that remains is neutralized with carbonate of lime, this neutralization being necessary to facilitate the action of the yeast in promoting fermentation. From the neutralizing tank the solution is pumped into fermenting vats, Fig. 4, the liquid at this stage being similar to the "mash" obtained in the process of making alcohol from grain. When the solution or "mash" has reached a temperature of about 130 degrees C. yeast is added, and in an incredibly short time—about half an hour—a brisk evolution of carbonic acid gas takes place. Fermentation proceeds with much rapidity, and after eight to ten hours the process is complete. It is interesting to note here that fermentation of grain "mash" requires 72 hours. Upon the completion of the fermentation process the liquid is passed into the distillery, which is equipped with an ordinary still and condenser.

Careful tests have been made with white pine of the North, white and red cedar from the Pacific Coast, and yellow pine from the South. The first experiments were made with white pine, but all of these woods it has been found, can be treated advantageously for the production of ethyl alcohol. It was with some misgiving that yellow pine was used, as this wood is rich in turpentine, and fears were entertained even by Professor Classen himself that this fact would result injuriously. Much to the surprise of the chemists, however, it was not only found possible to produce alcohol in an equal amount as from other woods, but turpentine was recovered to a large extent, without in any away interfering with the production of alcohol, the turpentine being recovered at the same time as was the sulphurous acid.

As has been previously stated, the Highland Park plant was for three months under the supervision of Professor John H. Long. Upon his retirement the management passed into the hands of Otto Sjostrom, a German chemist and assistant to Professor Classen, under whose direction much of the work at the original plant erected at Aix-la-Chapelle was carried on.

Charcoal and Other By-Products.

The report of Oscar Daube, general manager of the American Chemical & Carbon Company of New York City, upon the utilization of the sawdust residue is of special interest to owners and operators of charcoal blast furnaces, especially those who have already installed wood alcohol plants. The report is as follows:

Some time ago I visited your works at Highland Park and examined with great care and interest the Classen process for producing ethyl alcohol from sawdust, and consider the same practical and of great importance. Following your suggestions that I examine the tailings left after the fermentable sugar is extracted from the sawdust and report on the practical use to which these can be put, I had some of the tailings sent to my laboratory in New York, where I have made exhaustive tests during the last two months.

I have not the slightest doubt in advising you that the tailings may be briqueted, and from these briquettes charcoal of the highest grade suitable for all blast furnaces or other purposes requiring a first-class charcoal free from impurities may be obtained. The briquettes are made by pressure only, without the use of any binder. The charcoal is made from the briquettes in exactly the same way that charcoal is produced from wood and the usual by-products, such as wood alcohol, acetate of lime, wood tar, &c., are obtained.

I have made a very careful analysis of the charcoal to determine the percentage of carbon in it, and this analysis has been verified by the Metallurgical and Analytical Laboratory at 52 Beaver street, New York. I obtained with 850 degrees F. 87½ per cent. of carbon, which carbon is equal to that obtained by any other process. Ordinary charcoal is made from wood of different shapes and sizes, but as your briquettes are of uniform size the charcoal obtained therefrom would be more uniform in quality and more easily charred.

I also make the statement that so far as ash, sulphur and other impurities are concerned, there will be no more of these than in the present method of making carbon from wood. If it is found advisable after your large plant is established, it is equally possible to make charcoal from the tailings without briqueting the tailings. The granular charcoal thus made may be formed into bricks afterward. The amount of charcoal obtained from the briquettes is from 40 to 42 per cent.

I consider one of the great advantages of your process is that you make charcoal from green waste sawdust after you have extracted your ethyl alcohol, while an ordinary charcoal plant requires that the wood be seasoned for at least 18 months. You thereby save capital required to purchase and carry the wood and eliminate risk from danger of fire.

The figures I give you are from soft wood sawdust (long ton). The figures on wood alcohol and acetate of lime would be largely increased if hard wood sawdust were used. Hard wood sawdust is obtained in large quantities in Northern Michigan and elsewhere. A complete 25-ton daily plant to make briquettes, charcoal and by-products would not cost to exceed $25.000. The gross returns per day from such a plant would be:

1,000 bushels charcoal, at 10 cents per bushel	$100.00
82½ gallons wood alcohol, at 65 cents per gallon	53.62
750 pounds acetate of lime, at 1½ cents per pound	11.25
125 gallons wood tar, at 5 cents per gallon	6.25

Classen Lignum Company.

The Lignum Inversion Company of Chicago, with a capital stock of $110,000, is the organization which has secured the Classen patents in the United States, and under whose direction all work in this country thus far has been accomplished. J. M. Ewen of Chicago is president, and J. K. George of London managing director. A number of wealthy and influential business men of Chicago, Pittsburgh and New York have become interested in the company, as well as large saw mill interests in Mississippi. It is understood that the Lignum Inversion Company is soon to be converted into the Classen Lignum Company, with a capital stock of $2,500,000, and arrangements will be shortly completed for the erection of a plant for the manufacture of alcohol by the Classen process, with a capacity of 100 tons per day, at a point in the South, and a contract has been signed for the erection of another plant of equal capacity in Northern Michigan.

Pacific Coast News.

SAN FRANCISCO, CAL., September 8, 1903.—The past week has been the best one for business for some time, and it is evident that the fall trade has set in with all its activity. The exchanges at the Clearing House for the week ending last Saturday were among the largest this year and exceeded by over 30 per cent. those for the corresponding week last year. There was no special reason for this other than the good trade of the opening season. In this the Hardware houses participated to the full extent, as there are many lines of industry in which they are especially interested which are flourishing and of which mention has been made heretofore in these columns. The only indication of falling off is in the building line, but that is prospective rather than otherwise, as there are a very great number of buildings contracted for earlier in the year which are going on any how and which require many of them till the end of the year to complete, and few of which can be completed before that period. The trouble is the high wages of labor, which make many hesitate who would otherwise improve. Coupled with the high wages of labor, and as a corollary of it, is the high price of material, which is higher here than ever before. As to wages, some of the craftsmen engaged in the preparation of supplies for buildings get, it is said, $11 per day, while others get $7 and $8, while $4 to $4.50 is about the lowest, outside of common labor. But this city and most of the cities in the country are growing fast, and this will all right itself after a while. The extent of the building boom in this State may be estimated when it is known that the number of men connected with the building trades in yesterday's Labor Day procession is given in the morning papers at 20,000, while at any rate the number did not fall short of 15,000. This, of course, included every one in the city that works on a building or supplies material, except the foundrymen and machinists.

The lockout at the American Steel & Wire Company's establishment at Fifteenth and Folsom streets, in this city, may be regarded as practically at an end; not in-

deed, that the old force have been taken back again, but that their places have been nearly all supplied, and the plant is being worked to pretty nearly its full capacity. The management states that everything is working well about the establishment and that business is good. Indeed, the progress of this industry has been wonderful, the output nearly trebling since 1899.

The imports of iron and steel lately have been practically unprecedented. I subjoin particulars of some more recent imports. The "Orion," from Antwerp, had 18,899 packages of merchant iron and 8009 packages of steel. The "Dundonald," from Newcastle, England, had 1300 tons of pig iron; the "Homeward Bound," from Antwerp, had 3807 rails and 1047 bundles of fish plates and 585 steel angles; the "Queen Victoria," from Antwerp, 934 packages of fish plates and 4280 rails; the "Alsterdamm," from Antwerp, 350 tons of pig iron, 1206 bars of iron, 3238 rails, 314 bundles of iron, 984 splice bars, 115 steel beams; the "Luxor," from Hamburg, 839 packages of iron, &c. But the bulk of the fleet from Antwerp, Hamburg, Newcastle-on-Tyne, &c., is still on the way. They will be to hand before the close of the year, and the market here will be well stocked with all descriptions of iron and steel that we have been unable to obtain from the East or that, even with the duty added, have been cheaper than Eastern goods. This is a reversal of trade conditions and reminds us of old times, when everything of that nature almost was obtained from abroad. The Panama steamers have added their quota of hardware, pipe, &c., but supplies via Panama have been comparatively small.

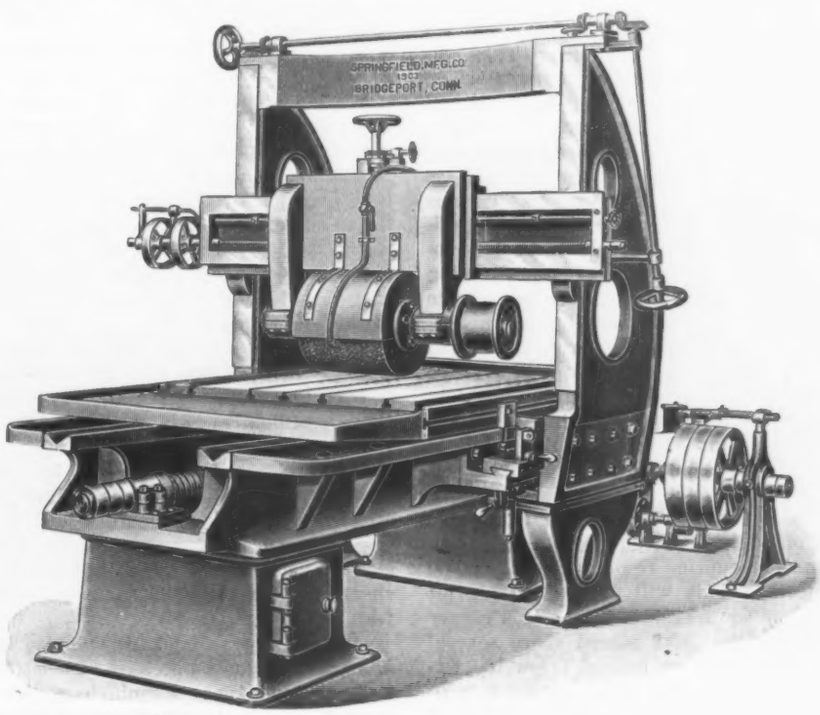
The export trade from San Francisco has been of fair volume, but not as large as it was earlier in the year. A considerable quantity of machinery, pipe and hardware has been shipped to the Hawaiian Islands and to China and Japan, the big steamer "Korea," which cleared the other day, having large shipments for the Orient. The "Alameda" for Honolulu also took out a good deal.

J. O. L.

The Buffalo Drydock Company are building a collier for the Pere Marquette Railroad. When completed it will be one of the largest of its kind on the Great Lakes. Its dimensions are 255 feet over all, 241 feet keel, 43 feet beam and 21 feet 6 inches depth. The Buffalo Drydock Company also launched from their ways on Saturday last the maiden boat for the new Miller Transportation Company of Buffalo—the "P. P. Miller"—a steel steamer of modern type, 375 feet in length over all, 354 feet between perpendiculars, 48 feet beam and 28 feet molded depth, valued at $250,000.

The Springfield Surface Grinder.

The accompanying illustration represents a new line of surface grinders which the Springfield Mfg. Company of Bridgeport, Conn., are placing on the market. These machines are specially constructed for the use of water, which, by the manufacturers, is believed to be a prime factor in rapid and accurate surface grinding, as it not only keeps the work cool and avoids expansion, but also assists in keeping the emery wheel open and free cutting. The castings are heavy and rigid. The emery wheel used is 16 inches in diameter, with a face one-third of the width the machine is intended to grind. The emery wheel travels automatically between the uprights, while the platen also travels automatically. By this construction it will be seen that the entire surface is quickly covered, and that it gives the work a cross cut similar to a file, and at the same time, by the oscillation, the wheel always retains a straight face. By a simple attachment the oscillating device is instantly thrown out at the will of the operator, and if desired work can be ground close to a shoulder. The emery wheel head has a micrometer feed. The cross rail carrying the emery wheel head is quickly adjusted by the elevating gears connected with a hand wheel. An automatic idler is provided to adjust the belts according to the thickness of the work to be ground. With these machines a large variety of surfacing work can be performed more accurately and cheaper than is possible with the iron planer. The emery wheel (which is practically a rotary cutter with a broad face running at a high speed) reduces the metal rapidly. These machines are built from 2 feet long by 14 inches wide up to 20 feet long and 10 feet wide.



THE SPRINGFIELD SURFACE GRINDER.

The New York offices of the sales organization of the Westinghouse Electric & Mfg. Company, consisting of the sales department, department "I," the export department and the general agent's office, have been moved to the new Hanover Bank Building, corner of Nassau and Pine streets, where they occupy the entire seventeenth floor. The executive, financial and stock transfer offices will remain on the fourth floor of the Equitable Building, where the present organization of the Westinghouse Electris & Mfg. Company have been quartered since 1889.

Lake Iron Mining Matters.

DULUTH, MINN., September 14, 1903.—While iron ore shipments did not diminish in August and are even slightly increased over the month last year, there is no question that they will decline very perceptibly in the present month. Even the United States Steel Corporation are not shipping as heavily as formerly, while others are very much quieter. Numerous Steel Corporation boats are in the upbound coal trade and several are to be tied up at once. No ore is moving, excepting what is chartered for shipment, and the demand for new lots is apparently over. There is little grain yet arriving at upper lake ports, and for what there is the East and Europe show no demand. Vessels cannot have as good a year as expected and far below 1902. But in 1902 certain fleets of well managed modern steel ships in the ore, coal and grain trade between Duluth and Lake Erie cleared as high as 22 per cent. net, and it was far from an exceptional season.

Important Jobs of Earth Work on the Mesaba.

Some very important jobs of earth work have been let, or are in contemplation, on the Mesaba range. They emphasize the fact to which attention has been called in these letters, that open pit mining, either by steam shovel or by milling, is becoming more and more the leading factor on that range, and that depths of overburden that a few years ago would have forbidden those methods are now not obstacles in their way. Thicknesses of overburden up to 75, 80 and even 90 feet are not now considered impossible for an open pit mine, if there is sufficient ore beneath them to justify. Prices for stripping have varied of late somewhat, and have tended a trifle downward in the past two or three years, but are an average of not far from 37 to 40 cents a yard. As 1 yard of surface weighs very much less than 1 yard of ore, the removal of a thickness of a body of overburden equal in thickness to the ore to be mined beneath it is very far from ton for ton and is accounted good practice, while in some circumstances it is possible, perhaps, to take off more than foot for foot.

The Minnesota Iron Company have just let to the Drake & Stratton Company a contract for the extension of the Fayall open pit, amounting to more than 2,000,000 cubic yards of material. This will extend the big pit east of the shafts to the southwest, and take in a corner of the old No. 1 dump, that was placed there several years ago in the belief that no ore existed below it. Explorations conducted the past year have shown this to be a mistaken belief, and the removal of the portion of the dump and the large permanent overburden beside it is to take place. This contract will call for the employment of about 500 men and four steam shovels, day and night, for at least three years and is to begin at once.

The Iroquois Mining Company, operators of the mine of that name in the east half of the northwest quarter of section 10-58-18, have let contracts for the stripping of 700,000 yards of overburden from the property. This runs up to 75 feet in thickness, and is one of the deepest stripping contracts let on the range. The mine is to be milled and a shaft is now down in ore. Work on this job begins at once and ore is to be shipped the coming year. This property is managed by Rogers, Brown & Co., and is to furnish ore for the Iroquois furnaces at Chicago. There are so far developed about 2,500,000 tons of a 57 per cent. non-Bessemer coarse ore.

The Minnesota Iron Company, who are operating the Hull and Rust mines, south of the Mahoning, at Hibbing, are considering their stripping and operation as steam shovel properties. They have been extensively developed as underground mines, and the ore is now won by the square set system. There is from 60 feet to more of surface, and it is generally recognized that if developed by stripping they will show at least a fair comparison with the enormous bulk of Mahoning. Hull is ore for ½ mile north and south, and it is supposed that the ore body runs through it and Rust pretty nearly to the village of Hibbing. For some months explorations have been in progress there to determine accurately the extent and character of the surface. Many million yards would ultimately be taken from these properties if it is decided that they shall be stripped.

No contracts have been let for the immense job to be undertaken at the Monroe, but it is expected that if prices are right it will be let shortly. This will probably be one of the largest contracts ever undertaken. Two shafts are to be operated from the area to be stripped

Earthwork operations close to Hibbing alone now include the enormous stripping at Burt mine, from which 1,000,000 yards have been dug in the past 12 months; Morris, Albany, Leonard, Leetonia and some other properties.

A few years ago the proportion of open pit mines on the Mesaba was small, much less than their relative importance would indicate. Now, with mines opening at the rate of 15 to 20 yearly, the percentage of stripped properties is larger than ever before. Half the number of mines and very much more than half the ore obtained are in part, at least, stripped properties.

The same method is extending to other ranges, and will soon be in use on every one of the Lake Superior districts, excepting, perhaps, the Gogebic and Vermillion.

On Other Ranges

On the Vermillion range iron ore explorations in section 25-63-12 have shown the presence of a great depth of greenstone and slate. These were carried out under a theory of geological formation that has more or less adherents locally. The noted section 36-63-11, which has been explored by the Section Thirty Company, is now in the hands of Geo. J. Lonstorf, who has put two drills at work close to where the final work of the Section Thirty Company was done. He will increase these drills, and will also sink two exploratory shafts a little later. One of these is to tap a body of ore cut by one of the Section Thirty Company's drills, and the other north of it, where there is hope of ore and where the present drill work is expected to prove it. All other exploratory work on the Vermillion range is at an end for the time being.

Almost a complete change of administration takes place at Negaunee Mine, now in Cleveland-Cliffs' possession. For some time the mine's output will be restricted and development work pushed, for the new owners are assured of possession for a great many years and can carry on dead work hitherto impossible. Another shaft will be sunk when the need and location are manifest.

W. H. Yawkey and M. Q. Fay, large Mesaba operators, have made a purchase of some 30,000 acres of coal and ore lands near Birmingham, Ala. Mr. Fay states that there may be 700,000,000 tons of ore and half as much coal on the lands. Exploration is to begin at once and development will quickly follow. The price to be paid is put at $700,000. D. E. W.

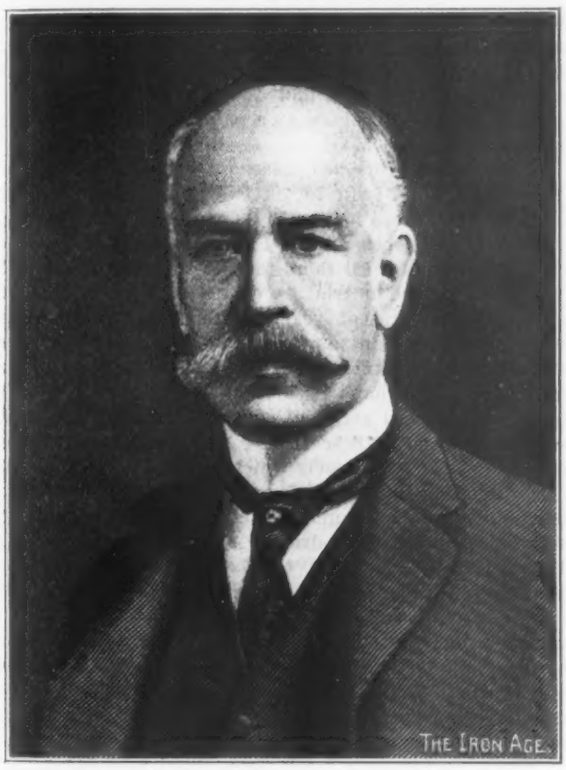
The New England Foundrymen's Association.

The September meeting of the New England Foundrymen's Association was held on the 9th inst. at the Exchange Club, Boston. There was an attendance of about 40 members and guests. The principal speakers were W. E. Viall of Brown & Sharpe Mfg. Company, Providence, R. I., and George N. Kingsbury, Rhode Island Commissioner to the St. Louis Exposition. Mr. Viall's paper was entitled "A Discussion of Some Business Methods of the Machine Shop, Dealing with Competitors, Traveling Men, &c." The following firms were admitted to membership: Rhode Island Malleable Iron Company, Hillsgrove, R. I.; Holyoke Machine Company, Holyoke, Mass., and James Stewart & Co., South Boston, Mass. Arrangements have been made with W. H. Pfahler for the October meeting, and an attractive list of speakers is being prepared for subsequent meetings.

The American Sheet Steel Company are spending thousands of dollars in the Indiana gas belt, near Muncie, in endeavoring to find a second reservoir of natural gas below that from which the present decreasing supply is drawn. One test well is down 2500 feet, and the company will sink it 1000 feet deeper before abandoning it.

Frank J. Hearne.

Col. Frank J. Hearne of Pittsburgh, who last week was elected president of the Colorado Fuel & Iron Company, was born at Cambridge, Md., on September 21, 1846. After receiving an academic education, he entered the Troy Polytechnic Institute, and in June, 1867, he was graduated with the degree of civil engineer. Immediately after graduation he was appointed assistant engineer of the Hannibal & St. Joseph Railroad, which he held until 1872. Upon the earnest solicitation of his father he resigned his position with this road to go with the Riverside Iron Works, at Wheeling, W. Va., in the capacity of assistant general manager. He was connected with the Riverside Iron Works for 27 years, and when that company were absorbed by the National Tube Company, he was made first vice-president of the consolidation, in charge of manufacturing. When the National



FRANK J. HEARNE.

Tube Company were absorbed by the United States Steel Corporation, he was made president of the National Tube Company, resigning that position some time ago, intending to devote his entire time to private interests. However, he has been induced to accept the position of president of the Colorado Fuel & Iron Company. In Mr. Hearne that company have secured a very strong man. Mr. Hearne has removed from Pittsburgh to Denver, and intends to make his home there for some little time at least.

Many Indiana manufacturers have learned since they have paid fees of $5 to $10 to alleged boiler inspectors who visited the plants that the Indiana law does not provide for commissioned inspectors of boilers. The work may be done by an engineer or boilermaker selected by the factory owner. The boilermaker must have had at least five years' experience and the engineer not less than ten years' experience with boilers carrying not less than 70 pounds pressure.

The regulations for the allowance of drawback on car wheels manufactured by the Griffen Wheel Company of Chicago, Ill., in part from imported pig iron, have been extended, as far as applicable, to similar exportations by the company manufactured at their works at Overland, near Denver, Col., in part from imported pig iron.

Some Curious Steam Engines.

BY EGBERT P. WATSON.

Over half a century ago there was a curious steam engine at work on the East Side in New York City driving a saw mill. It was simply a reacting engine, having no valves, pistons, connecting rods, or any of the details usually found on steam engines. In design it was the same as the lawn sprinklers in use at the present day, having two arms revolving horizontally at the top of a vertical shaft, the arms being hollow and pierced with small holes at their extremities. I think the arms were also slightly curved at the ends. Steam entered the vertical shaft, and issued through the holes, and the reaction of it upon the atmosphere generated a certain force. I do not know what pressure was carried, but it was not great, probably, for in those days boiler making was by no means an exact science, and 50 to 60 pounds was considered good work. This engine, as regards its design, is one of the first applications of steam, being credited to Hero some years before the Christian era, but it ran a modern saw mill successfully for many years, until it was finally broken up for junk.

Another curious engine was much more modern, having been designed by Horatio Allen, and built at the Novelty Iron Works in New York City some time in 1859-1860. This was a pendulum engine, so called, from the fact that the cylinder, about 40 inches in diameter, was swung from its upper head (the cylinder being vertical) instead of trunnions, as in an oscillating engine, and in other respects similar to the last named type. It was never duplicated, not having any especial advantages over ordinary engines.

An engine with a fixed crank was a novelty many years ago, the cylinders, two in number, being attached to a fly wheel revolving around the crank, but this had manifest disadvantages, and I do not know that any of them were ever put to commercial use.

During the Civil War William Wright, a well-known engineer of the period, designed an engine which was a decided novelty in motors of its kind. The cylinder was in the form of an annulus, or ring. It was not a complete circle but a segment of one, and the piston traveled through an arc in making its stroke. As may be imagined by machinists, this was a very difficult cylinder to bore, and the piston was equally bad to turn true, but both problems were successfully solved by special tools designed by Mr. Wright. This engine was put into the United States gunboat "Pequot," but did very little service.

Aside from curiosities of general plan and design, there are instances of a want of knowledge of first principles, which seems to be general at times, for they are patented over and over again. One of these is the cylinder with two pistons in it, the impression being that if one is good two must be better, the result showing that the power developed is the same in both cases.

The ends aimed at in the early days of the steam engine seemed to be to provide unique valve motions or peculiar actions of the details generally without any knowledge of how they would answer, or what especial end was to be gained by them. So long as they were novel and unlike any engine previously made, the designer was satisfied, but unless it was proved that the changes were in the direction of economy manufacturers were not, and their popularity was short lived. In these days everything is subordinated to economy of the working fluid. An engine may be as ugly as sin, or the most perfect piece of mechanism that was ever devised, but if it saves coal it assuredly "fills a long felt want."

D. H. McAbee, chief factory inspector of Indiana, says one of the troubles of his department in enforcing the law with regard to safety devices in factories is to get the employees to use them, after the employers have furnished them. Many of the safety appliances attached to the machines are discarded or ignored by the workmen, apparently because they think their use casts a reflection on the workman's ability to take care of himself.

Turbines for the United States Navy.

A Special Board to Investigate Their Efficiency.

WASHINGTON, D. C., September 15, 1903.—The recommendation for the experimental installation of turbine engines in a 5000-ton cruiser, or scout ship, made by Admiral Melville on the day of his retirement from the post of Chief of the Bureau of Steam Engineering, has resulted in a decision by the Department to appoint a special board to examine carefully all available data with regard to the work of these engines, to inspect a number of vessels in which they have been installed and to prepare an estimate to be submitted to Congress for an appropriation for a vessel of at least 5000 tons to be equipped with turbines. The board will determine whether the funds now at the disposal of the Department will defray the cost of installing turbines in a torpedo boat or other smaller vessel, and if this question is decided in the affirmative, practical tests may be made without waiting for action by Congress. In any event, the Department proposes to take immediate steps to settle the question of the availability of this type of engine for use in the United States Navy, and it is probable that at a comparatively early date one or more vessels will be equipped with turbines as the basis of elaborate and exhaustive tests.

While the *personnel* of the special board has not yet been announced, several officers of the engineer corps have received intimations that they will be expected to serve thereon, and they have accordingly begun to gather all available data with regard to the progress thus far made in the installation of turbine engines in both war and merchant vessels. From the material thus collected it appears that both the German and British navies are giving much attention to this subject, and that a number of passenger vessels and private yachts equipped with turbines have not only passed rigid tests, but have been operated under service conditions for a number of months with very satisfactory results.

Turbines in the British Navy.

The first war vessels to be equipped with turbine engines were built for the British admiralty in 1898-99, when two torpedo boat destroyers, the "Viper" and the "Cobra," of about 370 tons displacement, were constructed. The motive power of these vessels consisted of two distinct sets of engines on each side. There were four screw shafts in all, entirely independent of each other, the two on each side being driven by one high and one low pressure turbine respectively, of about equal power. Two low pressure turbines drove the two inner shafts, and to each a small reversing turbine was also permanently coupled and revolved idly with them when going ahead. Two propellers were placed on each shaft, and in the case of the "Cobra," an additional propeller on each shaft was subsequently adopted. Both vessels passed their official trials and fulfilled all the guarantees of their contracts, greatly exceeding the required speed. The "Viper" attained a mean speed of 36.581 knots on a one hour's full power trial. A guaranteed speed astern of 15½ knots was realized, and the turbines in both vessels, after the first adjunstments had been made, worked very satisfactorily and with an immunity from trouble said to be quite unknown with the reciprocating machinery of similar vessels. Unfortunately both these vessels were lost at sea before their efficiency under service conditions could be fully demonstrated, although the British Admiralty concedes that the disasters could not in either case be attributed in the remotest degree to the fact that the vessels were propelled by turbines.

While there are now no turbine propelled vessels actually in commission in the British Navy, the Admiralty has recently purchased the "Velox," a torpedo boat destroyer, and turbine machinery has been ordered for the "Eden," a torpedo boat destroyer, and the "Amethyst," a third-class cruiser. The "Velox" is fitted with machinery similar to that of the "Viper," capable of developing upward of 10,000 horse-power. For emergencies, two triple expansion reciprocating engines of 150 horse-power each are connected by detachable claw couplings to the low pressure turbine shafts. The engines of the "Eden" are designed to develop 7000 horse-power and a speed of 25½ knots, while those for the "Amethyst" are rated at 9800 horse-power and a speed of 21¾ knots is called for. In view of the great variation of horse-power required in modern war vessels, two additional cruising turbines are permanently coupled to the shafts of the main low pressure turbines. When worked at reduced power the steam from the boilers passes through the cruising turbines in series and thence to the main turbines; by this means a high ratio of expansion of the steam at all the lower speeds is obtained and the loss by throttling of the steam is avoided.

Turbine Propelled Passenger Vessels.

The first passenger vessel to be propelled by turbines, the "King Edward," was built in the spring of 1901 to the order of Capt. John Williamson of Glasgow. She was 250 feet in length, 30 feet beam and 6 feet draft. Her motive power consisted of three turbines, one high pressure driving the central shaft and two low pressure working in parallel driving the side shafts; in the exhaust casing of each of the low pressure turbines was placed a reversing turbine. The "King Edward" made a speed of 20.48 knots, and during the seasons of 1901 and 1902 her performance as a passenger vessel was very satisfactory.

The second turbine passenger vessel, the "Queen Alexandra," was built in 1902 for Capt. John Williamson, her dimensions being 270 feet in length, 32 feet beam and 6 feet 6 inches draft. Her machinery was similar to, but more powerful than, that of the "King Edward," and she attained a trial speed of 21.43 knots. In the spring of the present year the tandem side propellers were replaced by single propellers of larger diameter and somewhat finer pitch, which has had a beneficial result in greater smoothness of motion and a slight improvement in the speed and coal consumption.

The success of these two vessels led to the adoption of turbines for two vessels which have recently gone into commission on the British Channel service. The "Queen," plying between Dover and Calais, is 310 feet in length, 40 feet beam and 25 feet draft. A recent report from the United States consul at Calais states that after two months of service this vessel has shown herself a wonderful craft, making the passage of the channel in 50 minutes, thus beating the swiftest of her predecessors by about a quarter of an hour and running without noise or vibration. The other channel boat, to be employed between Newhaven and Dieppe, was launched June 13 and is about ready for her trials.

Three yachts have lately been fitted with steam turbines. The largest is the "Lorena," built at Leith for A. L. Barber, New York. She is 253 feet in length, 33.3 feet beam and 13 feet draft. The turbines are similar to those of the "King Edward," but somewhat larger and designed for a speed of 16 knots, but on her trial on May 16 last she easily made 18.02 knots. The yacht "Emerald" was recently built at Glasgow for Sir Christopher Furness, and was the first vessel propelled by turbines to cross the Atlantic. She is 180 feet in length by 28.7 feet beam. In crossing the Atlantic last April she experienced very severe weather and heavy winds, but it is said the propellers never raced and the machinery worked admirably. The yacht "Tarantula," built for the late Colonel McCalmont, is similar in dimensions to a torpedo boat, but more heavily built. On her trial she reached a mean speed of 25.36 knots.*

In the German Navy.

In addition to the development of the steam turbine in the British Navy and merchant marine, the Turbinia Company, the German Parsons Marine Company of Berlin, have received two large orders for marine turbine installations, to be used for the Imperial Navy of Germany. One is of 5000 horse-power for a sea going torpedo boat and the other for 10,000 horse-power for a small cruiser, the "Merkur." These will be the first ships of the German Navy in which reciprocating engines have been supplanted by steam turbines. For both installations steam will be supplied by water tube boilers. Two of the five turbines for the torpedo boat are cruising tur-

* All of the above were provided with turbines of the Parsons type.—THE EDITOR.

lines, intended for low speeds. The turbines are arranged on three shafts, each of which operates two propellers. The speed of this torpedo boat is to be about 27 knots.

The cruiser "Merkur" will combine certain advantages never before brought together in a turbine propelled vessel. Six turbines have been designed operating four shafts, each of which carries two propellers. Two of these turbines are for cruising speeds. A notable feature is that the entire plant will be below the protective deck, while the screws will be well below the water line, thereby insuring protection from gun fire in battle as well as smooth running during heavy seas.

Admiral Melville's Views.

The special board to be appointed to investigate the question of the desirability of the turbine engine to be used in the United States Navy will devote its attention especially to determining the accuracy of the deductions drawn by Admiral Melville from his own inquiries as to the efficiency of this type of engines, including the following points as set forth in the Admiral's recent letter to the Secretary of the Navy:

With a turbine little or no care or precaution is required in starting or reversing, and these operations can be performed as rapidly as the necessary valves can be manipulated.

Turbines are now reversed by means of a supplemental set of reversing blades and nozzles to which steam is admitted when desired.

As the propellers used with turbines are smaller than those with reciprocating engines, the tips of the upper blades will be more deeply immersed and less likely to be uncovered by the pitching of the vessel, so there will be less possibility of racing. But even if racing does occur there will be no risk of serious injury or breakdown as with a reciprocating engine.

There will be little or no vibration caused by the turbine and the vibration from the propellers will be greatly decreased by reason of their smaller size. This absence of vibration and perfect balance of the parts will allow much lighter engine platforms to be used.

The absence of all interior rubbing parts will allow highly superheated steam to be used, which cannot be done satisfactorily with the reciprocating engine; this in turn will add greatly to the economy of the turbine. As most water tube boilers are well adapted to the use of superheaters, it is very probable that the introduction of turbines will quickly be followed by the use of superheaters for marine work.

As each turbine has but two bearings there is nothing to get out of line in the turbine itself; in the case of a reciprocating engine there are generally four main bearings that must be kept in perfect alignment and reciprocating parts that must be kept in right angled alignment with the main bearings. As the turbine would have but two bearings any working of the vessel would not disturb it and could only tend to throw it out of adjustment with the line shaft; this tendency, however, would be no greater than is now the case with the reciprocating engine.

The absence of all working parts except a few of the very simplest description, and especially the absence of linkages and interior rubbing parts in the steam spaces, reduces the cost and labor of upkeep to the minimum; this, though important, is not so important in the case of a naval vessel as is the ability to keep the sea almost indefinitely without laying off the engine for repair.

The lubrication of a turbine is almost ideal, since the absence of adjustable bearings permits forced lubrication without appreciable loss of oil or any of it being carried into the condenser by the exhaust. The same oil can be pumped through the bearings over and over again, being cooled in passage by a water coil.

With regard to the prospect of obtaining the necessary appropriation to install turbine engines in a small cruiser, the officials of the Navy Department are very sanguine that the money will be forthcoming in view of the showing that can be made before the Naval Committees of both houses of Congress. It is not probable that the experiment will result in an immediate enlargement of the naval programme, as the Department has now in contemplation a recommendation for at least one vessel of about the tonnage desired for a scout ship as suggested by Admiral Melville. W. L. C.

The London *Finanz Chronik*, a paper published in the interest of German financial and commercial circles, calls attention to the importance of South Africa as a market for agricultural machinery. This paper states that an order for 17,000 eight-horse plows has been given to three American manufacturers. An agent for an American firm, whose office is in Johannesburg, has sent orders to the United States for the shipment of agricultural implements and machines aggregating $389,320 in value. The importation of small iron ware has also increased heavily.

The American Steel Foundries.

The first annual report of the American Steel Foundries, which has just been issued, states that the earnings of the constituent companies for the fiscal year ended July 31 were $2,192,679, from which was deducted, for renewals, relining, repairs and maintenance, $432,741, leaving net earnings of $1,760,938. Other income amounted to $27,026, making total income $1,787,964. General expenses, taxes, rentals and interest on loans amounted to $231,011, and interest in the bonded debt to $23,550, leaving a surplus applicable to dividends of $1,533,403.

From this surplus were paid dividends of $700,000 on outstanding stock of constituent companies, and three dividends on the preferred stock of the steel foundries, amounting to $697,500. The surplus carried to profit and loss account is thus $835,203.

President Joseph E. Schwab calls attention to the expenditures during the year of $403,246 for additions and extensions chargeable to capital account, which, he says, have resulted in a material reduction in the cost of production and a large increase in capacity.

A reserve fund has been created against any possible losses on accounts and bills receivable. The directors, he says, did not hesitate to adopt in the first year of the company's existence a policy of liberal reservations for all possible adverse conditions, and it is believed that the allowances made in this respect meet the requirements of the most conservative management.

During the year the entire capital stock of the American Steel Bolster Company, amounting to $500,000 face value, has been acquired by the American Steel Foundries, payment therefor having been made by the issue of $500,000 face value of the common stock of the latter company. The American Steel Bolster Company own sundry patents covering the manufacture of cast steel bolsters for railway cars. These bolsters were manufactured by one of the companies acquired by the American Steel Foundries under a royalty agreement which was assumed by the latter company in the purchase of the business and property of said company. The bolster company were acquired on December 1, 1902, and the cash saving by this purchase since that time, on the basis of the royalty agreement, is approximately $700,000, or at the rate of practically 21 per cent. per annum on the par value of the stock issued therefor.

It is stated that there is now a larger tonnage of orders on the company's books than at the time of their organization. The physical condition of the properties has been much improved during the year, and additions and improvements are contemplated whereby it is hoped to still further increase production and reduce costs. The general balance sheet as of July 31 shows:

Assets.

Real estate, plant machinery and other permanent investments	$29,012,124
Additions and improvements during year	403,246
Other real estate	310,365
Deferred charges and advance payments	39,586
Materials, supplies, &c., on hand	1,011,533
Accounts and bills receivable	1,859,803
Sundry investments	20,600
Cash	660,755
Total	$33,318,012

Liabilities.

Preferred stock	$15,500,000
Common stock	15,500,000
Bonds of subsidiary companies	471,000
Bills payable	200,000
Vouchers and current accounts payable	634,715
Pay rolls and interest accrued	149,062
Contingent reserves	28,032
Surplus	835,203
Total	$33,318,012

The annual report of the Colorado Fuel & Iron Company states that the second new furnace was blown in November 21, 1902; the third, May 31, 1903. The new Bessemer department blew its first heat December 22, 1902. The new spike factory was started June 1, 1903. The open hearth plant made its first heat June 29, 1903; new blooming mill was started June 29, 1903; rod mill, July 5, 1903, and wire department July 14, 1903.

The Hot Well as an Oil Extractor.*

BY A. H. ELDREDGE, SO. ST. JOSEPH, MO.

Figs. 1 and 2 give the plan and cross section of a hot well that has been in successful operation during the past year.

The well is divided into three parts.

A, the common discharge side for the steam condensers.

B, the discharge side for one steam condenser.

C, the hot side, or pump side.

F is 3 inches lower than the one at D to insure a free passage in and out of B.

The hot side, or pump suction side, C, is supplied from B through E. The temperature of this water is increased by returning to it, so far as possible, all steam drips and pump or other exhausts, raising its temperature to from 160 degrees to 180 degrees F. This gives a good start for a desirable feed water temperature, and at the same time saves many traps, together with their accompanying troubles and expense, insuring the return of the various drips with their British thermal units to the

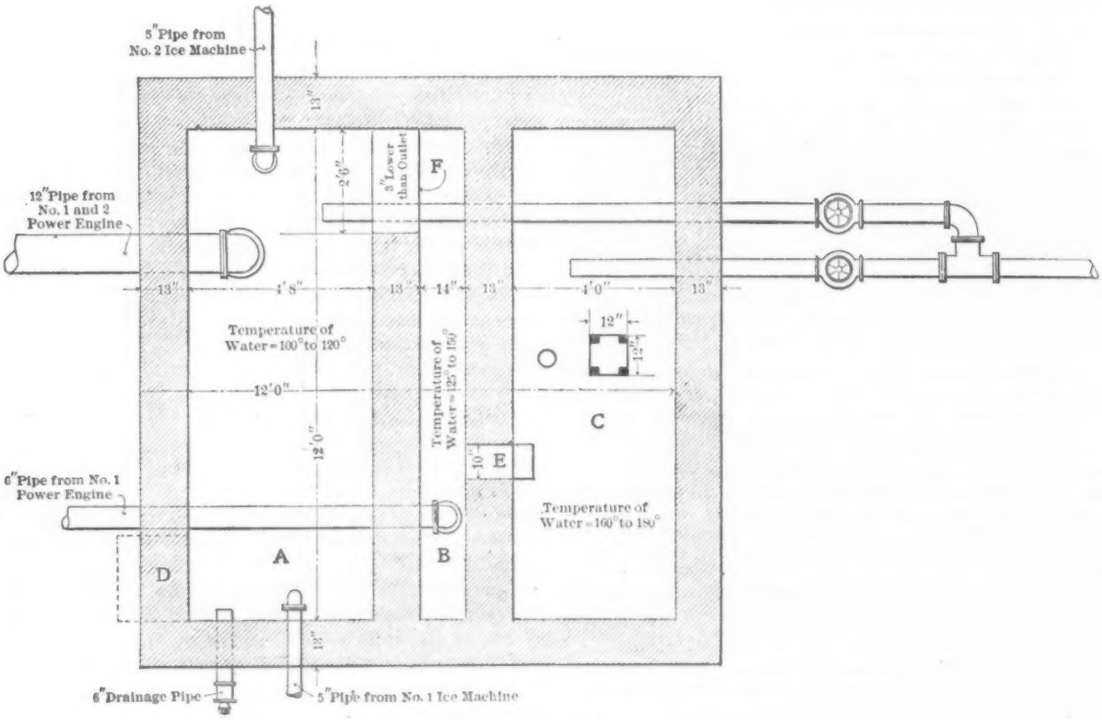


Fig. 1.—Plan of Hot Well.

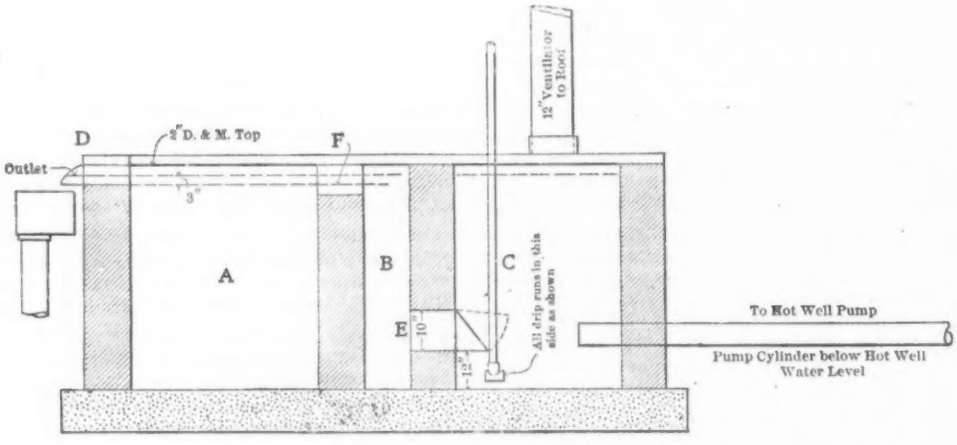


Fig. 2.—Section of Hot Well.

THE HOT WELL AS AN OIL EXTRACTOR.

The operating of the well is as follows: The bulk of the condensing water enters at A and overflows to a cistern at D. The water from a single jet condenser enters B. The water from this condenser comes from an engine that runs continuously nearly the entire year. Its temperature is kept between 125 and 160 degrees F. to favor the boiler feed temperatures, although at the expense of the vacuum, which runs from 20 to 24 inches.

The higher temperature also saves condensing water.

There are two outlets from B, one an underflow at E into C, and one an overflow at F into A. The overflow at boilers. The only outlet from C is through the pump suction, and only such water enters C as is sufficient to supply the pump. Should the water at any time be cut off from B, then the supply would come automatically from A through F. The hot well is provided with drain pipes in A and C for clean out purposes.

Its Action as an Oil Separator.

The water enters B at a comparatively high temperature, and any oil in the water will rise rapidly to the surface, while the oil from but one condenser is all that has to be taken care of. At the same time the flow of the water from B to C is very slow, giving ample time for the

* Paper presented at the Saratoga meeting of the American Society of Mechanical Engineers.

oil to rise to the surface and pass off through the overflow F.

Over 3000 horse-power of boilers, at one of Swift & Co.'s plants, are fed from this hot well, and no sign of oil has been found in any of the boilers or their connections.

The water from C has also been chemically analyzed a number of times, and but the slightest trace of oil has ever been found. The trace found was undoubtedly due to the oil coming in through a pump exhaust, and has in no way affected the practical working of the hot well.

The Manufacture of Weldless Steel Pipes and Shells.*

BY HEINRICH EHRHARDT, DUSSELDORF.

The consumption of tubes and hollow bodies of all kinds made of malleable metal is now not only very considerable, but is continually increasing, partly on account of the incapability of cast tubes to withstand a heavy internal pressure, and partly owing to the fact that even where a moderate pressure is employed the greater thickness of the wall increases their cost much beyond that of tubes made from rolled iron. The latter are still for the most part manufactured from bent plates, the edges

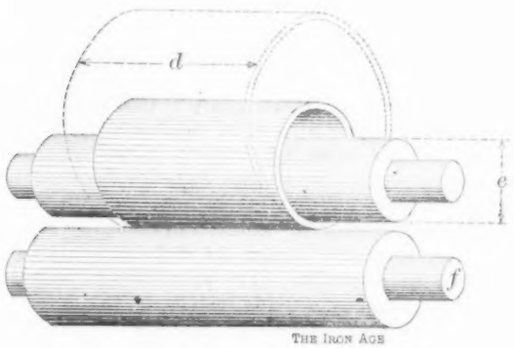


Fig. 1.—Rolling Out Ring.

the upper and outer surface of the cylindrical billet is pressed against the wall of the die immediately on the entry of the mandrel, recesses being formed in the interior of the die by which the billet is firmly held, while the lower portion is pressed forward as the mandrel continues to penetrate it. By this means the billet is elongated by about 80 to 90 per cent., and the diameter of the hole is from the first considerably larger than when pierced in the former manner by the old process, which is a great advantage in making large cylinders for subsequent rolling out in a rolling mill. In same cases a single piercing operation suffices to make a blank of the desired length and cross section, but long cylinders with thin walls have to be drawn out to the required length before rolling. The second operation then consists in rolling out the ring to the larger diameter with the desired thickness of wall. It is of special importance to give as large a diameter as possible to the inner roll, because in rolling out the shell, as shown in Fig. 1, the length *d* depends upon the diameter *c* of the inner roll. If the length *d* of the shell is excessive, the roll which is passed through it will bend on account of the extra pressure upon the rolls necessitated by the too great length of the shell. This difficulty is effectively met by the arrangement shown in Fig. 2, which has been patented by the author. Nevertheless, in order to insure greater accuracy in rolling out the rings,

Fig. 2.—Method of Preventing Bending of Rolls.

of which are joined either by riveting, welding or soldering, notwithstanding the long continued efforts of both manufacturers and consumers to do away with such seams and to forge and roll the tubes from a single blank. These efforts have been attended with greater success since wrought iron has given place to mild steel as a structural material, the former metal being by nature ill adapted to withstand the various modes of treatment either in the cold or in the hot state, especially the operations of bending, boring or piercing, and welding, all of which tend to weaken the tube.

Although it may appear a simple matter to pierce and draw out an ingot of mild steel when hot, yet many experiments were necessary before a practical and economical method was discovered. For making tubes of smaller sizes up to 10 or 12 inches diameter several processes have been in use for the last ten years by which serviceable tubes are manufactured cheaply. Among these the author's own process is one of the best known, consisting of piercing and drawing out billets, by means of which tubes of excellent quality are produced.

A more difficult operation is the manufacture of tubes and hollow bodies of large diameter, such as ring courses for boiler shells, furnace tubes, hydraulic cylinders, &c., in which the abolition of riveted or welded joints is a decided advantage. This problem has only quite recently been solved, previous attempts in this direction having led to no practical results. For the preliminary operation of piercing the billet a process patented by Gleichmann proved the most suitable, being possessed of advantages which rendered it essentially superior to the author's own process. The main feature of this method is that it is a great advantage to make the diameter of the roll as large as possible. According to this the lower roll *f* is made to oscillate during the rolling operation about the central point, so that the pressure is continuously and evenly distributed. In other respects the arrangement of the mill resembles that of a tire rolling mill, and the rolling out of the rings is performed in exactly the same manner, though much more rapidly, on account of the greater power employed, the capacity of the mill being approximately that of an ordinary plate rolling mill. The cost of rolling is therefore no higher than that of rolling ordinary plates, and since the cost of piercing is also very small, as may be gathered from the previous description, these seamless rings can be more cheaply produced than welded or riveted rings, besides being lighter and of more value on account of their higher tensile strength and general trustworthiness. These excellent qualities have been proved in many trials, and that they have met with due recognition is shown by the fact that numerous orders have been given for ring courses for steam boilers, especially for locomotive boilers, and also for other purposes, such as steam and water pipes for heavy pressures, cylinders and cylinder linings for hydraulic presses, accumulators and centrifugals, live rollers for rolling mills, and in short for anything where great strength combined with durability is required.

The Reisholz Forge and Rolling Mills manufacture single rings by this process up to 8 feet in diameter and 10 feet in length.

* Paper presented at the September (1903) meeting of the Iron and Steel Institute.

A convention of manufacturers of Portland cement was held at Niagara Falls last week. Fifty manufacturers of this article were in attendance.

The Baraboo Iron District Mining Developments.

Recent developments in the new iron ore fields in the Baraboo range, Sauk County, Wis., have been of unusual interest and no little importance. Actual mining operations have been quietly conducted for nearly a year at the Illinois mine, located about 3 miles from North Freedom, which is on the Chicago & Northwestern Railway, 8 miles from Baraboo. Before the shaft was sunk the property was thoroughly proved by churn and diamond drills.

According to competent mining engineers the geological conditions which exist in the Baraboo district are similar to those in the various old ranges of the Lake Superior region, the Sauk County formation being most like the Gogebic and Menominee districts. The formation is evident for fully 15 miles, 9 miles of which have been traced from the east drill to the west hole, and 3 miles of this thoroughly proved. The dip of the rocks is about 60 degrees and the ore basin is from 1 to 2½ miles wide.

Work at the Illinois Mine.

The shaft at the Illinois mine is now 400 feet in depth, 300 feet to the first level, the second level being 100 feet below the first. Ore has been taken out of the first level for a distance of 250 feet to the north, and 200 feet on the second level. The east and west drifts on the first level have been cut about 200 feet each way. The foot wall is of gray slate, next a mixed vein of ore and jasper, and the hanging wall above the rich ore is of red slate with sandstone capping and surface of clay and tillable soil. The mixed ore and jasper crops out at the surface, where a pit has been dug, the ore from this excavation being known as "paint rock," and has been utilized by the Chicago & Northwestern Railway for some years for the manufacture of metallic paint.

The ore is red hematite, running from 50 to 65 per cent. metallic iron. It should be noted that actual mining operations have proved the ore 10 per cent. better than was indicated by the analyses from the borings of the drill.

An important development, as showing the trend of the ore, is that at the Illinois shaft. Rich ore was struck at a vertical depth of 250 feet, while 2000 feet to the north the rich ore was struck by diamond drill at a depth of 1115 feet, from which it is inferred that the ore again tends toward the surface within the 3-mile territory.

Sinking a Shaft at the Sauk Mine.

The Iroquois Iron Company are now sinking a shaft within a mile or so of the Illinois property, which they call the Sauk mine. The diamond drill on this property has shown the best result of any hole in the district, the analysis showing 63.11 per cent. of metallic iron. The character of the sample is well shown in the following: At a depth of 281 to 285 feet, core; 285 to 291 feet, core and cutting; 291 to 300 feet, drill cutting; 300 to 302 feet, drill cutting; 302 to 305 feet, core; 305 to 308 feet, core; 312 to 336 feet, drill cutting; 336 to 340 feet, core; 340 to 348 feet, cutting.

Estimated Quantity of Ore.

According to A. P. Silliman of Hibbing, Minn., who has thoroughly examined the property, there is in the ground at the Illinois mine 6,997,000 tons of ore running from 57 to 60 per cent. of metallic iron; in the La Rue mine, immediately adjacent, 6,500,000 tons of the same grade, and in the Deering Harvester property, south of Freedom, 9,000,000 tons. In addition, it is estimated that on these three properties, including the Illinois, the Wisconsin and the Iroquois, there are from 20,000,000 to 25,000,000 tons of ore running 55 per cent. or better in metallic iron, or from 85,000,000 to 90,000,000 tons averaging 50 per cent. or better. Upon this basis it is estimated that within the 3 miles of territory which has been thoroughly proved there are fully 200,000,000 tons of merchantable ore.

Transportation Facilities.

The Chicago & Northwestern Railway Company are preparing to build a branch line to the mines from North Freedom. Right of way has been secured, lumber is on the ground for the bridging of the Baraboo River, and construction will be begun immediately. It is believed that within 60 days shipments of ore will be begun, as there are already between 9000 and 10,000 tons of ore at the surface at the Illinois shaft. The Chicago, Milwaukee & St. Paul are also preparing, it is stated, to build a line from Sauk City to the mines, a distance of 20 miles. The International Harvester Company, who have acquired the Illinois mine of the Illinois Iron Company, have just made a long time contract with the Chicago & Northwestern Railway for the transportation of ore to Chicago, a distance of 175 miles. The rate is understood to be about 80 cents per ton, and the ore can probably be taken to Milwaukee at about 60 cents per ton. A little thought reveals the importance of this transportation cost to producers of pig iron in the Chicago and Milwaukee districts, giving them, as well as the Baraboo mines, considerable advantage over the old range mines. The cost of taking ore from the mines of the old ranges on Lake Superior to Duluth, Ashland and Two Harbors is on the average 80 cents per ton. To this must be added the docking charges, which are considerable, and the transportation charges from lake ports to destination. This means a saving of at least $1 a ton or more to consumers at Chicago and even a greater advantage to producers at Milwaukee. Transportation from Milwaukee to Lake Erie ports can be made with facility and at relatively as low a cost as from Lake Superior points.

Acquirement of the Property.

The center of present mining activity in the Baraboo range is in Freedom and Baraboo townships of Sauk County, the ore formation running from northeast to southwest. Nearly all this property was acquired by a syndicate consisting of Oliver B. Whiteside and W. G. La Rue of Duluth, Minn., and Herman Grotophorst of Baraboo, Wis. These gentlemen have purchased about 800 acres at an average of $100 an acre, the full investment amounting to $84,000. Before the discovery of iron, land was selling in this section for farming purposes at from $40 to $50 per acre. The syndicate have leased property to various companies on royalty on a sliding scale basis, which will induce the taking out of the lean as well as rich ore. It is understood that 15 cents per ton is to be obtained for 50 per cent. or less and 30 cents per ton for 59 to 60 per cent. of metallic iron, and so on. It is estimated that the syndicate will obtain about 25 cents per ton, on an average, from the various companies acquiring leaseholds to develop the property. Work is now being done by the International Harvester Company, the Iroquois Iron Company and the Wisconsin Iron Company.

History of the Range.

There has been and still is much skepticism in regard to the Baraboo section developments, but in this respect history has merely repeated itself, as mining operations in the older ranges, especially in the Gogebic field, were conducted in the face of similar opposition, rumor attributing failure to all these sections alike in the early stages of work.

The early history of the discovery of iron ore in the Baraboo range is interesting, and reaches back some 12 years ago, when W. G. La Rue, then connected with the Joliet Steel Company, was instructed to go to Baraboo, Wis., and report on conditions in that section, where it was claimed that iron had been discovered. Mr. La Rue found that the ground selected had been "salted," and the promoters acknowledged that there was no ore at that point, but that as they were in straits they were endeavoring to obtain money to reach Colorado. They told the investigator, however, that they believed iron could be found near North Freedom. Mr. La Rue visited that section, which is now the center of active operations, and found some indications which led him to believe that the territory was worthy of proving. The Joliet Steel Company, however, were unwilling to take up the matter at that time, and for years nothing tangible resulted.

In 1898 the Douglas Iron Company were organized, who in August, 1899, secured an option, and later purchased a tract of 80 acres south of North Freedom. About $60,000 was spent in drillings and surface operations. But for various reasons, among which were internal dissensions, this company failed to prosper, and the

various stockholders—20 or more—were scattered from Georgia to California. Mr. La Rue, having faith in the territory, after assiduous work secured quit claim deeds for five-sixths of the property, which he and associates purchased at $25,000. The other one-sixth was purchased at $4000, making the total investment $29,000. This was after many trials. The original option on the property was taken at $100,000, but this was gradually reduced from year to year, following no important mining developments. More options were taken on adjacent property in September, 1899, and on November 20, 1899, a number of provings were made. In April, 1900, the investigators became satisfied that a paying mine existed in the territory, the result being the closing of the options and the actual purchase of the property. Since that time various other people have taken options on all surrounding territory, and at the present time nearly all the country for miles around is under option.

On April 22, 1901, the syndicate gave an option to the Deering Harvester Company, which option was subsequently extended, but on April 27, 1903, the lease was completed, the Harvester Company paying $50,000 advance royalty. In January, 1902, the Iroquois Iron Company of Chicago, closely identified with Rogers, Brown & Co., entered into a similar contract with the syndicate, and after being thoroughly advised by competent engineers, began the sinking of a shaft at the Sauk mine, as has previously been noted.

In addition to the $60,000 which was expended by the old Douglas Iron Company, about $50,000 has been paid out for diamond and churn drill work, divided among the various companies now interested in the field.

About 132 acres of land have been secured, at a cost of $16,000, for a town site, to be called LaRue, but as rich ore has been found on this property at a depth of about 1000 feet, the town seems doomed to give place to a mine. The town site will probably be removed to the land over the foot wall.

Appended is a table of analyses showing the results of actual mining in the area where the drill showed an average of 51.17 per cent. of iron. It will be noted that the actual mining operations average about 10 per cent. better than the drill provings.

First Level—Cross Cut.

1903.	Iron.	Phosphorus.	Feet depth.	
January 4	48.50	0.033	207 to 211	Mixed ore and jasper.
January 4	62.00	0.047	211 to 217	Sampled by Church & Clark.
January 4	65.60	0.033	215 to 220	West side.
January 4	63.60	0.036	210 to 220	Grab sample in drift.
January 4	63.00	0.032	210 to 220	Stock pile, top of cut.
January 4	61.80	0.043	210 to 220	Grab sample, 25 tons, bottom of cut.
January 4	62.80	0.046	220 to 227	30 tons day hoist.
January 4	61.20	0.034	220 to 227	30 tons night hoist.
January 4	61.50	0.034	227 to 235	25 tons day hoist.
January 4	60.00	0.038	227 to 235	25 tons night hoist.
January 15	57.00	0.034	233 to 237	10 tons day hoist.
January 15	56.60	0.042	233 to 237	10 tons night hoist.
January 18	54.40	0.029	237 to 240	Hard blue ore.
January 18	54.30	0.034	237 to 240	Hard blue ore.

First Level—East Drift.

January 18	63.80	0.045	0.08 to 4	Soft blue ore, day hoist.
January 18	64.00	0.039	0.08 to 4	Soft blue ore, night hoist.
January 18	62.50	0.043	4 to 10	Soft blue ore.
January 18	63.00	0.030	10 to 16	Soft blue ore, day hoist.
January 21	61.20	0.040	16 to 20	Soft blue ore, 15 tons.
January 31	65.50	0.041		Breast sample at 25 feet.
February 2	63.08	0.049		Average first 7 samples.
March 3	63.44	0.040		Breast at 25 feet.
March 2	65.55	0.049		Breast at 30 feet.
March 2	64.44	0.052		Breast at 35 feet.
March 8	65.31	0.034		35 to 45 feet.
March 8	59.96	0.064		At 48 feet, some jasper.
March 9	62.25	0.062		Soft blue ore.
March 9	55.23	0.065		Ore and jasper.
March 10	50.46	0.064		Banded ore.

First Level—West Drift.

January 9	61.50	0.038	Skip sample blue ore.
January 21	63.00	0.048	Skip sample blue ore.
January 22	64.50	0.042	Skip sample blue ore.
January 23	62.40	0.033	Breast of drift.
April 29	63.75	....	60-ton skip sample.
April 29	64.50	....	11-ton skip sample.
May 25	58.00	0.052	Breast of drift.
June 25	57.62	0.049	Cross section in drift at 75 feet.

Second Level.

June 24	44.67	0.047	238 feet.
June 26	51.21	0.048	243 feet.
June 27	53.84	0.051	246 feet.
June 29	59.24	0.043	260 feet.
June 30	49.13	0.056	262 feet.
July 1	54.11	0.050	...
July 2	55.50	0.055	265 feet.
July 3	54.20	0.059	267 feet.
July 7	53.56	0.057	...
July 8	51.07	0.070	...
July 9	51.90	0.066	...
July 10	53.42	0.070	277 feet.
July 14	54.80	0.060	286 feet.
July 15	50.40	0.069	...

The following table shows the analyses of the drill provings at the Sauk mine of the Iroquois Iron Company:

	Iron.	Phosphorus.
314 to 318 feet	63.50	0.072
318 to 322 feet	63.90	0.061
322 to 327 feet	63.50	0.039
327 to 329 feet	65.60	0.033
329 to 334 feet	62.00	0.024
334 to 336 feet	60.10	0.030
336 to 338 feet, no core.		
338 to 340 feet	30.00	0.016
340 to 344 feet	40.00	0.034
344 to 349 feet	35.60	0.055
349 to 353 feet	37.00	0.043
353 to 354 feet	47.30	0.066
354 to 358 feet, quartz.		
358 to 361 feet, no core.		
361 to 363 feet	44.30	0.063
363 to 371 feet	35.30	0.043
371 to 373 feet	45.30	0.060
373 to 376 feet	23.40	0.034

Central American Notes.

SAN JOSE, C. A., August 31, 1903.—Since the Government has taken hold of the Puerto Cortez Railroad there seem to better chances for this line eventually to be built from the Atlantic to the Pacific Ocean. On both sides of the central plateau there are 50 or 60 miles of flat land. The mountain engineering would not be very difficult, and the most costly portion would be putting steel bridges over the Chamelicon, Ulua, Comayagua, Tegucigalpa and Perspire rivers. Every one of these steel bridges would have to be of the very best construction as the rivers rise in a night during the rainy season and destroy nearly everything in their track. There is little doubt that this line would be of great advantage in transporting the necessary materials to the Pacific intended for the Isthmian canal. There are now two companies (one American) on the ground trying to make arrangements with the Government for the construction of the railroad. This line will eventually tap the mahogany forests and mining districts of the interior. The latter include gold, silver, copper and the huge iron mines of Agalteca.

Few countries are richer than this, and few on this continent are less known by American capitalists and exporters. In fact, it is probable that the exhibits from here at the St. Louis Exposition in 1904 will open the eyes of the world. Commissioner Chandler has been able to obtain the official participation of every one of these republics, including Honduras, Guatemala, Salvador, Costa Rica and Nicaragua, as well as Santo Domingo and Haiti. This, I believe, will be of great use in expanding our trade relations with these republics. C.

F. H. Buhl, former president of the Sharon Steel Company, has deeded the new club building, which he has erected for the town of Sharon, to nine trustees, who are well known in iron circles. These trustees are Norman Hall, J. J. Spearman, Simon Perkins, Alexander McDowell, Samuel McClure, manager of the Stewart Iron Company; James P. Whitla, John Carley and William L. Wallis, former heavily interested in the Sharon Steel Company, and P. L. Kimberly, a partner of Mr. Buhl in several large coal, iron and mining enterprises. The building is never to be used for any kind of religious exercises. The formal dedication will occur about the last of this month.

The New York sales offices of the Nernst Lamp Company have been removed from the Equitable Building to the new Hanover Bank Building, 11 Pine street.

The Iron Age

New York, Thursday, September 17, 1903.

DAVID WILLIAMS COMPANY, - - - - - - - - PUBLISHERS.
CHARLES KIRCHHOFF, - - - - - - - - - EDITOR.
GEO. W. COPE, - - - - - - - - - - ASSOCIATE EDITOR.
RICHARD R. WILLIAMS, - - - - - - - - - HARDWARE EDITOR.
JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

Iron and Steel in Architecture.

The apprehension is firmly implanted in the public mind, as the result of a good deal of ingenious but mischievous speculation, that the use of iron and steel in the framing of buildings has brought to an end the period of "monumental and enduring architecture." It may be that monumental and enduring architecture is a thing of the past, but not because there are any "lost arts" connected with the building trades, nor because in the modern use of materials we have fallen upon evil ways. Nothing endures in architecture which is practical and is built with a view to a satisfactory return upon the capital invested in it. When it has outlived its maximum usefulness it may be retained for sentimental reasons, or because the ground it occupies is not immediately needed for something else, or because for some reason the tide of life has swept by its location and left it stranded as might be the bones of a wreck upon the shore. Generally speaking, the useful life of a building in New York, where every inch of area must be utilized, is about 25 years. True, the onward sweep of progress forms occasional quiet eddies, and buildings therein may stand for half a century, or even longer, largely because the future development of the neighborhoods where we find them is still indeterminate and the wisest foresight cannot predict with confidence what form of new improvement will be most profitable. Even in New York these stagnant spots are found here and there, but what happens therein establishes no other rule than that of constant degeneration of neighborhoods unless this tendency is counteracted by constant reconstruction. The only significance of these facts is that monumental and enduring architecture is a feature of a cruder civilization than that of the present time. It cannot be financed, it does not pay when completed, and the more enduring it is the less it meets the requirements of modern life.

It would consequently seem to make very little difference whether the iron construction and the steel frame do or do not possess the elements of permanence which characterize stone, brick and well seasoned timber. There is very little reason to believe that if one of these modern business buildings was built of "one entire and perfect chrysolite" it would have any longer period of useful life than if built of the materials which in the present state of the art are available for structural purposes. Whether it is or is not true that in the progress of time the corrosion of steel frames will render such buildings insecure and necessitate their removal, is unimportant. It might be important if this result was threatened within five or ten years, or materially sooner than it would be required by business considerations, but nothing in experience thus far gathered affords a basis for this apprehension. Not many buildings of the new type of steel frame have had to be removed as yet for any cause, and of those into which iron has largely entered not enough have been destroyed to give conclusive data as to how long they would have lasted if the ground occupied by them had not been needed for other purposes. Two of these in New York are instructively typical.

The first of the modern steel frame buildings to be deliberately pulled down and scrapped stood at the corner of Broadway and Forty-second street, and was intended for hotel purposes. It was built to last a generation at least, but the ground it occupied was needed for a more important purpose, and after three years of life it had to go. Now three years is not a long enough period to afford a basis for generalization as to the life of steel frames, but in the demolition of this building, not well built originally, some facts were learned which are of interest and value. It is doubtful that if 20 years had been added to its life it would have told any very different story. The frame was run up with Z-bar columns, and the outside walls were supported at each story. The basement floor and the sidewalk beams and girders were supported on cast iron columns resting directly on the rock. All the steel columns were stepped into cast iron bases, with the exception of those of the north wall, which were supported on grillage beams resting upon the rock. Reference to the specifications showed that the steel work was to be thoroughly cleaned of scale and rust before leaving the shop, and given a coat of boiled linseed oil, worked into all seams and open spaces; all pins, pin holes and machined surfaces were to be coated with tallow and white lead, and all contact surfaces were to be thoroughly painted before joining. Pieces which could not be reached for painting after joining were required to receive two coats of paint before erection. Grillage beams were coated with asphalt before setting in place. It is doubtful if these specifications were in every instance strictly followed; indeed, it may be said with confidence that they were not. The work was "rushed" under somewhat unfavorable conditions. The frame was joined in winter, work was more or less delayed by severe weather and heavy snow, and for part of the time the bricklayers and stone masons pushed the steel workers so hard that nobody paid much attention to the letter of the specifications. Construction was begun in November, 1898, and was finished in one year. The steel frame was taken apart in December, 1902.

It would not have been reasonable to expect to find in the steel members of the framing any evidences of very serious deterioration during this brief interval; but it was not at all unreasonable to expect that in three years deterioration would have begun, and that its direction and rate of progress could at least be approximated from the visible beginnings. As a matter of fact, it was the conclusion of the experts of the Bureau of Buildings that no other corrosion of consequence could be discovered than had obviously begun and gained measurable headway before the building was covered in. There was considerable rust behind the splice plates of the column connections on the fifth story. At about this point the work was arrested by snow and sleet, and in the eagerness of the contractor to make up for lost time it is probable that many requirements of the specifications, as well as certain specific provisions of the building code, were either disregarded or perfunctorily complied with. To this such deterioration as was noticed in the steel frame of the building was undoubtedly attributable. Absolutely nothing was discovered by the inspectors detailed to watch every step of the work of demolition which warranted the belief that in any period which could be forecast from data at hand the steel frame of this badly constructed building would not have lasted as long as the stone and brick work, and longer than in that position any building erected in 1898 would be likely to be profitably useful. This is only one of a number of examples showing that neither fire, wind strain nor rust is effecting the de-

terioration of steel frames as rapidly as those who first adopted this form of construction had reason to expect.

Another interesting example of the life of metal properly used is furnished by the demolition of the building of the Bank of the State of New York, lately pulled down to make better use of the land. From illustrated details of what the demolition revealed, published by the *Engineering News*, we condense the following facts, which valuably supplement those above stated: This building was erected in 1855, and was considered in its day one of the finest business structures of the city. It was not a steel frame building. Its outer walls were of brick, faced on the front with marble; but the floors were of full iron framing, and it was probably the first example of riveted wrought iron construction. Between the floor beams was a sheet iron trough plate flooring leveled up with cement to support the wooden flooring. The work of construction does not seem to have been thoroughly well done in all details, especially in the matter of riveting. The method of construction, long obsolete, has historical interest, but probably would not repay analysis in this connection. The question of greatest concern would seem to be that of the condition of the iron work when it was taken apart. On this subject, *Engineering News* says:

All of the iron work appears to have had two coats of metallic paint, probably iron oxide. The condition of this paint covering, and of the iron work in general, at the time of taking down the building, was excellent. Rust, where it was to be found at all, was only incidental, in small patches here and there; but entire girders could be found with practically no spots of rust whatever. It is to be noted that both girders and beams (joists) were surrounded by an air space, and the lower side of the trough plate flooring also faced this air space. The beams, with their thinner metal and poorer painting (in some cases at least), showed more rust than the girders. The latter were practically unaffected.

When this building was put up there was very little of the knowledge and none of the experience which has since been gained in steel frame construction. The cast iron beam, used in supporting heavily weighted floors, had just begun to be displaced by the wrought iron beam here employed. In this instance the 10-inch floor beam was built up of thin plates of wrought iron. The web and flange plates were held together by rivets. The main girders were composed of two vertical web plates, with flanges connected thereto by vertical stiffeners riveted between the web plates, and engaging the flanges by means of tenons fitting into square holes punched in the flange plates. As these were not commercial forms of beams or girders, it may be assumed that the architect, James Renwick, who, as the architect of Grace Church and St. Patrick's Cathedral, was the Sir Christopher Wren of New York, was a man of great ingenuity in the discovery of convenient means.

So far as our present knowledge goes, all anxiety as to the durability of iron and steel frames may be dismissed. It is conceivable that under some conditions the deterioration would be very rapid, and that electrolysis might hasten disintegration, but no evidence has yet been found to warrant uneasiness on this score, or to give plausibility to the prophecy that the present tendency in architecture will go on until some lofty "skyscraper" collapses into its own cellar excavation in a heap of rubbish and a cloud of dust. This may happen, but it will not be in consequence of unsuspected corrosion of steel members. Why this system of construction will not give us examples of monumental and enduring architecture is explained by the reasons which compelled the removal of both the buildings hereinbefore described, to make room in the one instance for a 23-story newspaper building and in the other for a 25-story office building. The fashion of this world passeth away more quickly in buildings than in anything else which occurs to us at the moment.

The Speculator and the Walking Delegate in the Cotton Industry.

The welfare of the cotton crop is not alone a matter of interest and importance to the planter, the spinner and the weaver, but also to transportation companies, to producers and to all manufacturers supplying goods consumed in the cotton belt, which, in fact, comprise pretty much the whole business world. Even those who usually have but little immediate interest in the cotton industry have recently had their attention directed to cotton through the high prices resulting from the corner which was so successfully carried forward during the latter part of the 1902-1903 cotton season. Speculators for the rise have endeavored in various ways to justify their course, claiming an unusually short supply of raw cotton during the summer.

But the usual annual exhibit which has just been made by the *Financial Chronicle* throws a strong light among the shadows of speculation, showing that there has been but little, if any, foundation in fact to excuse the speculators for the derangement into which they have thrown the entire cotton industry, forcing mills to shut down, operatives to be thrown out of work and a reversal of the usual marketing of cotton in that the staple has been brought back from the mills of the North and from the spindles of Europe to New York and New Orleans merely for delivery on speculative contracts. Although the manipulators have gained millions of dollars, they have lined their pockets at the expense of the health of one of the greatest industries of the country, which was forced into idleness, more or less complete, and suffered untold loss for many anxious weeks.

Prices of the staple have been forced abnormally high —the highest in 24 years—and this increased cost has been reflected, although only to a moderate extent, in manufactured cotton goods, the higher prices, of course, being due to the manipulation at New Orleans. But the effect is much further reaching in that it has checked consumption and has stimulated the effort to increase cotton production in other parts of the world, all of which will react upon the American planter and even upon the speculator eventually. Such is the vitality and strength of the industry, however, that a gradual adjustment will follow, provided that the marketing of the staple is no longer interfered with seriously. The lateness of the crop gives assistance to the Southern manipulators. There is evidence, however, that the corner is crumbling, large deliveries of cotton at Fall River foreshadowing, it is thought, the end of the "deal."

Instead of being less, the total cotton yield of the 1902-1903 season is shown to be over 10,758,000 bales, being larger than for either of the two preceding years, and with the stock brought over from the previous year, making a total supply in this country of little less than 11,000,000 bales. Of this amount over 6,500,000 bales were exported, spinners in the United States taking 4,151,000 bales, a little less than half of which was consumed by Southern mills, leaving a stock on hand on September 1 of about 158,000 bales, the major portion of which was held by Northern spinners.

The takings for home consumption were slightly less and the exports slightly more than during the preceding year. The manufacturers of yarns and cloth experienced a prosperous season until well into the current calendar year, when the normal movement of the staple began to be interfered with. At this point it might be well to call attention to the fact that facilities for the manufacture of cotton goods have steadily increased, both North and South, but the South has continued to make rapid strides

until now the takings of the spindles in that section are less than a hundred thousand bales under the purchase of Northern mills. The total number of spindles in this country has increased to over 22,000,000, there being 15,200,000 in the North and about 7,040,000 in the South.

The world's statistics are interesting, it being estimated that there are 111,789,633 spindles in existence, of which 47,200,000 are in Great Britain, 34,000,000 on the Continent and 22,240,000 in the United States, the remainder being largely in the East Indies, China and Japan.

The world's production of cotton—given in commercial bales of 500 pounds for 1902-1903—is placed at 14,651,700 bales, 10,511,020 being credited to the United States, 2,792,000 to the East Indies and 1,078,680 to Egypt. This shows an increase of about 238,000 bales over the preceding year, which increase, with the exception of Egypt, was shared in by all producing countries. The total consumption is estimated to have been 14,351,930 bales, which is slightly less than during the preceding year. Of this amount Great Britain used 3,200,000 bales and the Continent 5,096,000 bales, or the whole of Europe 8,296,000 bales, while in the United States were consumed 4,151,000 bales and in the East Indies 1,400,000 bales.

Turning to the market for manufactured goods in the United States we find that the rich promises of the early season were not fulfilled, and the speculator was not alone responsible for the turning of prosperity into adversity. In the cotton industry, as in nearly all other lines of manufacture, the labor union has left its blight. Strikes of the operatives in New England and also in Philadelphia assisted to cause the paralysis of thousands of spindles and, of course, export trade suffered to even a greater extent than domestic business.

In the picture presented by the cotton industry we find an illustration of the potent power of the speculator and the walking delegate to harm the general welfare. They make artificial conditions which must eventually give place to natural forces, and in the reaction all must suffer alike between the millstones of greed on one hand and short sightedness on the other.

The Increasing Use of Concrete.

Many engineers and architects are of the opinion that the use of concrete is being carried much too far. While freely admitting its advantages as a structural material they maintain that its indiscriminate employment in building and engineering operations is certainly not to be commended. In particular locations and under peculiar conditions it possesses advantages over any form of masonry. This is true as regards rapidity of erection and economy. On the contrary, in some cases the expense attending its placing is so great as to render its use prohibitive. One unique advantage it does have—it is not affected harmfully by the gases of the atmosphere; in fact, if we can judge by the specimens of cement laid by the ancient Romans, it grows harder and more durable as time passes. The same cannot be said of some qualities of building stone and of some kinds of brick.

One principal—and perhaps the governing—consideration in its use is the cost of erecting the necessary form. In a retaining wall, such as many railroads are now building, this is a simple and inexpensive matter, and concrete is therefore cheaper than any form of cut stone. But in many cases of this character it would be cheaper to use rough masonry for a filling than to continue the concrete throughout. It becomes a close race, as to cost, when the form becomes at all intricate, or when it is difficult to erect. The cost of the raw material being very nearly alike in both instances, the selection would be controlled by the amount of labor required. Concrete can be placed by unskilled help, and unless this is offset by other questions its use would appear to be desirable from an economical standpoint. The fact that a concrete wall or pier, no matter what its size or situation, is not liable to crack is important.

One of the cheapest walls of which we have any knowledge is that of a factory building. The side walls are about 600 feet in length by 15 feet in hight and only 2 inches thick. In building these the first operation was to stretch expanded metal between the columns carrying the roof. The cement was laid on each side of this so as to bury the metal. No form was needed, the amount of material was small, and the work was rapidly executed by ordinary help.

It appears to be the more or less common practice to mix cement of high grade with what can be most easily and cheaply obtained. Cinders, gravel and broken stone all have their uses, the proximity of the material controlling the kind of mixture. There is comparative unanimity of opinion concerning the proportions of sand, gravel and cement. The sand and stone are used in such relative quantities as to fill, in union with the cement, all the interstices and produce a block free from "blow holes." The amount of each is, of course, affected by the result desired and the service expected.

Fluctuations in Iron Stocks.

The following table shows the extent of transactions and the fluctuations in quotations of the stocks of iron and steel companies in the month of August, with the dates on which the highest and lowest prices on each stock were realized:

Cap'l Issued.		Sales.	Low-Date. est.	Aug.	High-Date. est.	Aug.
	Allis Chalmers, com..	700	..	..	..	..
$41,233,300	Am. Can, com.....	6,850	3½	5	5⅝	19
41,233,300	Am. Can, pref.....	14,100	35⅞	6	45	18
29,000,000	Am. Car & F'dry, com.	35,100	30	10	34½	18
29,000,000	Am. Car & F'dry, pref.	4,750	81¼	6	85	3
24,100,000	Am. Loco., com.....	28,150	15⅝	5	20½	18
25,000,000	Am. Loco., pref.....	15,125	79½	16	85	31
	Am. Steel F'dries, com.	200	10	25	10	25
45,000,000	Cambria Steel.....	19,208	20	6	22½	18
7,000,000	Cent. Foundry, com..	100	1¾	13	2	31
7,000,000	Cent. Foundry, pref..	100	7	7	11	17
17,000,000	Colo. Fuel & Iron....	12,675	40⅛	6	55½	29
25,000,000	Crucible Steel, com...	16,650	8⅞	25	11⅝	4
25,000,000	Crucible Steel, pref...	6,351	70	28	74	3
1,975,000	Diamond State Steel.	100	½	28	½	28
	Dom. Iron & Steel....	4,700	8½	6	11¼	1
4,449,800	Otis Elevator, com...	350	28½	10	35	14
6,350,000	Otis Elevator, pref...	500	86	7	92	14
16,500,000	Pa., new, pref., Phil.	300	80	11	84	14
12,500,000	Pressed Steel, com....	18,900	33	10	44⅝	18
12,500,000	Pressed Steel, pref...	3,652	78	10	82	18
10,000,000	Railway Spring, com..	7,325	21½	10	26	18
10,000,000	Railway Spring, pref.	1,600	77½	12	83	12
27,191,000	Repub. I. & S., com..	22,500	9⅞	6	12¾	18
20,306,900	Repub. I. & S., pref..	32,000	59	6	68	18
7,500,000	Sloss-Shef. S. & I.,com.	7,100	29	6	36	14
6,700,000	Sloss-Shef. S. & I., pref.	100	83	5	83	5
20,000,000	Tenn. Coal & Iron....	73,200	32¾	10	47½	18
510,361,300	U. S. Steel Co., com..	654,600	20⅝	6	24¾	18
508,511,200	U. S. Steel Co., pref..	419,000	67	10	73⅞	18
	U. S. St. Co., new 5s..	4,358,000	76¼	10	80⅝	1
8,425,000	Virg. Iron & Coal,com.	500	..	..	..	..
1,500,000	Warwick I. & S.....	1,250	4	19	4½	28

At the Carnegie Steel Company's South Sharon Works there are about 4000 men at work, and yet there are many departments not working. Repairs on the open hearth furnaces will be completed in about ten days. No. 1 blast furnace will be ready for starting up again by October 1. A new bell and hopper is being placed on the furnace, and it has been relined also. No. 2 blast furnace, known as the "new furnace," will be ready for its first blast by November 1. The Pennsylvania Engineering Company of New Castle are doing much of the repair work.

The Iron and Steel Institute.

The Barrow Meeting.

BARROW-IN-FURNESS, ENGLAND, September 4, 1903.—Upward of 600 members of the Iron and Steel Institute filled to overflowing the hotels of Barrow and of the adjoining famous English lakes district, the houses of many residents of the town being hospitably opened to visitors. The district is famous for its mines, which yield a hematite of exceptional purity, which is melted in a large number of furnace plants. The town itself is a young one, from the English standpoint, having been created by the industries which rest upon the mineral wealth of the district. Conspicuous among these are the well-known steel plant of the Barrow Hematite Company, Limited, and the very large works of Vickers, Sons & Maxim, Limited. Although occasionally marred by threatening weather, the elaborate programme was carried through with *éclat*. Andrew Carnegie, the president, proved to be an admirable presiding officer, quick to act in an emergency, and eloquent and apt in addresses.

The proceedings began at the beautiful Town Hall on Tuesday, September 1, with a reception to the president and Council by the Mayor of Barrow-in-Furness, who subsequently, in a well delivered address, welcomed the Institute. Surrounding the president were past presidents and members of the Council, including such well-known names to the American iron trade as E. Windsor Richards, E. P. Martin, William Whitwell, David Evans, R. A. Hadfield, Hugh Bell, Sir James Kitson, G. Ainsworth, John E. Stead, Sir David Dale, Arthur T. Tannett-Walker, Sir Bernhard Samuelson and Bennett H. Brough, the secretary. James M. White, general manager, and A. M. Butchart, secretary, of the Barrow Hematite Company; Col. T. E. Vickers and James Dunn of Vickers, Sons & Maxim, and Axel Sahlin of the Millom & Askham Hematite Company were among the leading members of the local Reception Committee.

After responding happily to the address of the Mayor, resplendent in his official robes, and to Colonel Vickers, Andrew Carnegie delivered an address* in which he referred to the progress realized in the iron industry since the former meeting of the institute at Barrow-in-Furness in 1874, at which epoch making papers were read by the late Alexander L. Holley.

The first paper presented was that of R. A. Hadfield of Sheffield, who is well and widely known in the United States as the manufacturer of manganese steel, and as the metallurgist who has investigated with painstaking care the alloys of iron with silicon, aluminum, chromium and nickel. The present paper, on "The Alloys of Iron and Tungsten," is a continuation of the series. It is too elaborate and extensive to be printed in full, containing as it does not alone a full record of Mr. Hadfield's own experimental work, but also an exhaustive review of the researches and results of former experimenters and of the present state of the art.

J. E. Stead presented in his own behalf and that of Arthur Windsor Richards of Middlesbrough a paper on

The Restoration of Dangerously Crystalline Steel by Heat Treatment.

Notices which appeared in the daily press had created the belief that some revolutionary discoveries would be announced by Mr. Stead and his associates. Against these Mr. Stead protested as unauthorized and exaggerated. He showed a series of highly interesting microphotographs, and described a machine developed by Tom Westgarth of Middlesbrough for vibratory testing. Mr. Stead summarized his results as follows:

In reviewing our work we believe that the following facts have been firmly established:

1. The microscope in each experimental series indicates the same result, that heating at high temperatures causes a great development in the size of the crystalline grains, and reheating to about 870 degrees restores the original or a better structure.

2. If all structural steels in their normal rolled or forged condition are good, they can be readily deteriorated in quality by heating to a temperature a little above that to which steel is most commonly heated previous to rolling or forging.

3. Steel made brittle by such heating and dangerously brittle by heating at considerably higher temperatures can be completely restored to the best possible condition without forging down to a smaller size or by remelting.

Practically all our results show that not only are the original good qualities of normally rolled steel, after making brittle, restored by the exceedingly simple treatment of heating to about 900 degrees C. for a very short time, but that such steel is made considerably better than it was.

It is scarcely necessary to say how important and far reaching to steel workers and engineers this most valuable knowledge is.

That brittle "soft steel" can be restored by reheating has been proved by one of us, and confirmed by Professor Heyn, Mr. Ridsdale, and is well known in Sweden, but that carbon steels can be actually made much superior to the original properly forged metal by reheating to 870 degrees and cooling in air is revealed at this meeting for the first time. It will be remembered that one of us at the Düsseldorf meeting last year urged upon those to whom it might concern the imperative necessity of reheating to 900 degrees C. all forgings, and allowing them to cool in the air to remove accidental brittleness. The results given in this paper fully justify the statements then made. We would further urge that in every large forge and smith's shop Le Chatelier pyrometers should be introduced and in addition suitable furnaces for reheating the forgings, and that these should be systematically made use of.

From our own somewhat extensive experience we know for a fact that in many works steel is forged, rolled and finished at temperatures far above what is the best for the endurance of the steel when put into practical use, and we feel confident that if such appliances were to be intelligently employed the finished forgings would be greatly improved. It must be acknowledged that it has been upon the inferior enduring properties of such material that engineers have had to base their factors of safety, with the inevitable consequence that on the average much greater margins have been allowed than would be necessary if the steel were invariably obtained in its maximum condition of strength and safety.

We are sanguine enough to believe that, as research advances, that enviable goal will ultimately be reached.

The work presented is certainly a movement in that direction, but we hope that by treating steel so as to obtain in it a large proportion of sorbite, still nearer shall we be to the highest aim of the metallurgist of iron and steel. We aim at making material which will be twice or three times as enduring as that commonly made to-day, and we believe that we shall be able eventually to make it.

4. We are convinced that the system often specified by engineers that forgings when being annealed shall not be heated to a temperature high enough to cause a scale, is wrong; 870 degrees C. is coincident with a blue scale, and the steel is improved by heating till it forms this scale.

5. When the forgings are of unequal section they may be heated to 850 to 900 degrees C., and be then cooled in air, be oil quenched, or be treated by any other Sorbyizing process till they are a barely visible red, and finally annealed in a furnace at a dull red heat to remove the stresses produced by rapid cooling.

As indicating what work is being done in this direction in France we need only refer to a communication made by H. Le Chatelier to the International Association for Testing Materials in 1901, in which he quotes the experience of Mr. Barba.

That gentleman, who experimented on soft steel by subjecting it in the form of notched bars before and after heat treatment to the falling weight test, obtained the following strictly comparative results:

	Hight of fall of weight to produce fracture. Meters.
Natural or annealed below 900 degrees C.	0.40
Annealed at 900 degrees C. or above	2.00

* Mr. Carnegie's address was printed in full in *The Iron Age* for September 3.

Quenched above 900 degrees C. and annealed below 700 degrees C.	6.00
Quenched without annealing at 800 degrees C.	1.40
Quenched without annealing at 840 degrees C.	2.20
Quenched without annealing at 950 degrees C.	4.47
Quenched without annealing at 1150 degrees C.	5.00

After noting what can be done in improving steel by proper heat treatment, is it possible for any iron and steel metallurgists to continue to move in the old ruts?

Along the same lines was the paper by J. E. Stead and Arthur W. Richards on

Sorbitic Steel Rails

read at a later session, to which we refer now to preserve the continuity.

With reference to the term adopted, Messrs. Stead and Richards say:

With regard to sorbite, exception has been taken by some that it has not a sufficiently distinctive character to justify recognition of its individuality. It is pleaded that it is a transition condition of the carbide intermediate between the state in which it exists in hardened and annealed steels. As a matter of fact there is an agreement as to the description, but opinion differs as to its distinctive character. It was Osmond who first used the term, and his remarks, introduced below, show the ground on which he justified his conclusions:

From a physico-chemical point of view, there is not a great difference between pearlite and sorbite. But sorbite may be obtained side by side with pearlite by hastening the cooling without quenching, or by quenching a steel just at the end of the critical interval, or again, by reheating a quenched steel to about the same critical interval. For all these reasons sorbite may be considered as pearlite which has not been able to separate into ferrite and cementite by reason of lack of time, or from some other cause, and it seems to be true that it ought to contain a little more "hardening" carbon than free pearlite.

It has been said that sorbite is an unimportant constituent, and several authors have not distinguished it from pearlite. I think this is wrong, and for this reason, that in the first edition of this work I did not give with sufficient clearness ideas which were perhaps slightly confused. But if we remember that sorbite, although it can only remain present in annealed steels up to a certain point, is essentially characteristic of "negative" quenchings, and that this procedure considerably improves the mechanical properties of the steel, it would undoubtedly appear as legitimate and as necessary to distinguish sorbite from pearlite as it is to distinguish steels cooled naturally in air from steels which have been submitted to "negative" quenching, such as oil hardening, double quenching or tempering above blue heat. In my opinion it is very probable that the present methods in the manufacture of rails, &c., will eventually appear primitive, and I hope that the greater quantity of pearlite in our steel will be replaced in future practice by sorbite.

From the point of view of micrography, sorbite is characterized by the absence of striæ, and by the property of coloring rapidly by polish attack, or by tincture of iodine, even when the latter is diluted with its own volume of alcohol.

Now this particular condition, or variable condition, of the carbides in iron and steel, had never previously had a term given it, although it has nevertheless marked properties and distinct microscopic features, and can be readily detected in steel containing it. So distinctive are the properties which it confers on steel that for years it has been the practice of steel manufacturers, at considerable expense, to oil quench heated steel in order to obtain increased toughness and strength, and for wire manufacturers to patent their wire rods to arrive at a similar result. It is the sorbite produced which confers greater tenacity and toughness to the steels.

Again, the marked difference in the behavior to etching fluids on annealed and negatively quenched and tempered steels is another justification for giving a distinctive term.

High power magnifications also show an equally marked difference. Although there are distinct traces of incipiently separated carbide, between these microscopic particles is a dark amorphous ground mass quite different from the ground mass of the pearlite in the white portions. This dark ground mass is no doubt unsegregated pearlite, or what may be described as carbide of iron and iron in a nascent state of separation.

Mr. Stead in the course of his presentation showed in a striking manner, by experiment conducted before the meeting, the behavior of etching fluids, bringing out the word "sorbite" on a sheet very clearly.

The authors summarize the results of their work as follows:

The chief point of interest in our work is the simple method employed for producing sorbite in steel. The usual custom has been to reheat and oil harden or to quench completely in water and reheat to dull redness. In our method we avoid reheating, and quench the heads of the rails, as soon as they are sawn to length, to a point under Ar1 (normal), and allow the residual heat in the rails to do the tempering. The results of the later experiments show clearly enough that by partially quenching the heads and allowing the rails to temper themselves, although the elongation is decreased, the contraction of area remains practically the same.

The normal rail in "F" series of 37 tons tenacity when made sorbitic is increased in strength to 45 tons without diminution of the contraction of area.

In "G" series the normal rail with 36½ tons tenacity is increased to 49 tons, with a slight increase in the contraction of area.

In the last series (Series "H") the tenacity is increased from 43 to 50 tons, with a slight diminution in the contraction of area.

Pieces of the rail cut from the area of maximum sorbite on being tested by repeated reversals of strain showed greater toughness and endurance than the normal material.

The wear is very greatly in favor of the sorbitic material, as would naturally be expected, and we are sanguine enough to believe that by specially treating the rails in the simple manner described their life will be increased from 25 to 50 per cent.

The splendid results obtained by Mr. Brinell on quenching steel from about 850 degrees C. and reheating to 550 degrees C., and the results quoted by H. Le Chatelier, and the evidence given by Mr. Osmond, together with what has been advanced in this paper, all point in one direction, and should lead every iron and steel metallurgist to aim at replacing pearlite by sorbite in all structural steels which have to be subjected to friction, percussion or vibration when in use.

Finally, we may point out that although it is quite easy to treat hot rails in short pieces, we have not yet completely succeeded in treating 30-foot lengths satisfactorily. Our work is, however, far from complete, but we hope that before long we shall be able to report a complete success.

The afternoon was devoted to various excursions to works, one party visiting the plant of the Barrow Hematite Steel Company and another the Askham blast furnace of the Millom & Askham Company. This is the first of the furnaces in England to be modernized on American lines, but is now about to be blown out. During the 12 months from April 1, 1902, to April 1, 1903, the furnace produced 82,530 tons from an ore mixture containing from 44.5 to 47 per cent. A third party went to inspect the famous sea defenses of the Hodbarrow mines.

In the evening there was a brilliant gathering at the Town Hall, the occasion being a *conversazione* tendered by the Mayor.

WEDNESDAY SESSION.

The Wednesday session opened with the presentation of the paper on "Sorbitic Steel Rails," other papers on cognate subjects being taken as read, in order to discuss them together. In the course of the discussion Mr. Hadfield referred to the Coffin process for toughening axles, adopted so many years since at Johnstown, as an example of work along the lines indicated in the Stead-Richards papers. The principal point brought out was that the temperature to which the steel must be heated to effect restoration must necessarily vary with its character. Soft steels must be carried up as high as 1100 degrees, while about 800 is quite sufficient for low carbon steel. For 0.25 to 0.50 carbon 870 degrees C. is about the correct heat.

A very interesting paper, since it deals with the famous local ores, was that of James Leslie Shaw of Whitehaven on the "Probability of Iron Ore Lying Below the Sands of the Dudon Estuary." The last of the session was that of W. E. Pettigrew of the Furness Railway, entitled "Coal Fuel at Barrow-in-Furness." It deals with

tests to determine the value of various coals for locomotives.

The afternoon was spent by the majority of the party, in spite of a pouring rain, in an inspection of the splendid plant of Vickars, Sons & Maxim, Limited, which employs over 10,000 men. It is one of the great shipbuilding plants, notably for naval vessels, there being under course of construction the Chilean battle ship "Libertad," the battle ship "Dominion" and a number of submarine boats. The shops are admirably equipped and of the most modern type throughout.

In the evening there was a ball at the Town Hall.

THURSDAY SESSION.

The Thursday session opened with the reading of a summary of a very elaborate paper by C. H. Ridsdale of Middlesbrough on "The Diseases of Steel." It is characterized by that admirable completeness and system which the metallurgical world has learned to appreciate from former efforts of the author. There were also presented papers by Thomas Baker of Sheffield on "The Influence of Silicon on Iron," by R. M. Daelen of Düsseldorf on "The Ehrhardt Method of Manufacture of Weldless Steel Pipes and Shells," and by D. A. Louis on "The Regulation of the Combustion and Distribution of the Temperature in Coke Oven Practice."

After a series of resolutions of thanks for local entertainment and courtesies, C. Kirchhoff of New York, in behalf of the American members of the Institute, presented an invitation to the Iron and Steel Institute to hold its autumn meeting in 1904 at New York.

The afternoon was devoted to a visit to the docks and harbor of the Furness Railway Company, and then the members were conveyed to Holker Hall, the residence of the Cavendish family, one of the famous English houses, where they were entertained at a garden party by Victor C. W. Cavendish and Lady Evelyn Cavendish. In the evening the famous ruins of Furness Abbey, one of the largest and noblest in England, were illuminated by thousands of fairy lamps.

On Friday there were excursions to Fleetwood and Blackpool, the latter a well-known seaside resort, and to the lake country, including Lake Windermere and Grasmere.

Quite a number of Americans participated in the proceedings, among them being Charles Morgan of the Morgan Construction Company, Worcester, Mass.; Frank C. Roberts of Philadelphia; Edgar S. Cook, president of the Warwick Iron & Steel Company, Pottstown, Pa.; E. Trotz of the United States Steel Corporation, New York; Axel Sahlin of the Kennedy-Sahlin Engineering Company; Theodore Dwight, American Institute of Mining Enginers, and C. Kirchhoff of New York.

Cincinnati Fall Festival Exhibit Notes.

J. A. Fay & Egan Company, as one enters Machinery Hall, display a number of wood working machines, all electrically driven and in full operation, showing the character of work that can be produced. Something like 100 medals received from all parts of the world are also on exhibition.

The Bradford Belting Company, Cincinnati, Ohio, display a number of rolls of their Reliable and Monarch brands of oak tanned leather belting.

The Barrett Electric Company, Cincinnati, Ohio, display a great variety of the Barrett Cincinnati motors from 5 to 10 horse-power running 1000 revolutions per minute. These motors are simple in design, durable and substantial.

The Buckeye Bell Foundry (E. W. Van Duzen Company), Cincinnati, Ohio, make perhaps the most comprehensive exhibit in the hall, comprising chimes, gongs, both fraternal and church, bells, brass goods, barge bilge and deck pumps, water gauges, steamboat fittings, &c. Three enormous bells are suspended midway of the bridge leading from the exhibition buildings to the park, these being rung daily at the opening, noon and closing hours.

The E. A. Kinsey Company, Cincinnati, Ohio, jobbers in machinery and supplies, have grouped specimens in an extremely large space, of the productions of the following firms: The Bradford Machine Tool Company, lathes; the G. A. Gray Company, planers; Smith & Mills, shapers; Hisey-Wolf Company, portable drills; Hamilton Machine Tool Company, lathes; Morton Emery Wheel Company, Acme Machinery Company, Warner & Swasey, Brown & Sharp Mfg. Company, Gisholt Machine Company, Dwight Slate Company, Baker Brothers, the Bradley Company, the R. J. Van Dyck Company, E. E. Bartlett, each of whom have one or more tools on exhibition.

A novel and unique exhibit made by the John H. McGowan Company comprises steam pump of the duplex type operating an electrical fountain, water being taken by suction from tank and returned in form of conical shaped spray. The exhibit also contains deep well pumping engine, water works and elevator pumps, triplex pump, jet pumps and numerous steam and hydraulic appliances.

The Cincinnati Punch & Shear Company exhibit several of their latest types of power punches in large and small sizes.

The Warner Elevator Mfg. Company, Cincinnati, make a comprehensive display of elevators—electric, steam power and hand.

The Fosdick Machine Tool Company, Cincinnati, have on exhibition and in operation, in addition to their regular upright boring mill, a new type of horizontal boring, turning and milling machine combined. This is an entirely new construction and is attracting no little attention from machinery users. The machine on exhibition is the first completed, and was thought so well of that the Lodge & Shipley Machine Tool Company immediately purchased it, while a number of orders have since been booked.

The F. M. Watkins Company, Cincinnati, have one of each size of their well-known gas engines on exhibition, some of which are employed in generating current for the electric illumination of the hall.

The Lodge & Shipley Machine Tool Company exhibit two of their latest type of lathes—one 24 x 10 inches, also one 22 x 8 inches—driven with variable speed motors. These tools are specially adapted for the high speed steels now coming so prominently into use.

The Cincinnati Milling Machine Company exhibit two of their finest millers—A No. O and A No. 3.

The Cincinnati Shaper Company also show a number of their improved shapers.

The Cincinnati Machine Tool Company present several of their improved upright drills.

The Bickford Drill & Tool Company exhibit one of their new radial drills with all of the late improvements.

The Lane & Bodley Company, builders of high grade steam engines, show the advantages of one of their latest productions in the shape of a 400 horse-power engine.

The Dominion Iron & Steel Company's Coal Settlement.

A Montreal press dispatch, under date of September 12, gives the following as the official conditions upon which the Dominion Iron & Steel Company have agreed to surrender the lease of the Dominion Coal Company:

The coal company are to pay to the steel company $2,635,000, are to assume the current liabilities for wages, supplies, &c., of the coal department of the steel company's business, and are to receive the benefits of the current cash assets of the business. The latter are all good value, and the amount they should realize after payment of current liabilities would be about $1,500,000. The coal company therefore pay about $1,100,000 as a consideration for the surrender of the lease and the revision of coal contracts.

In connection with the surrender of the lease a new contract for coal has been arranged. This provides for all the coal which the steel company may require. The price of coal and other details are practically the same as under the lease. The concessions made by the steel company are the limitation of the coal supply to a plant of the capacity of that at present in existence, and one in contemplation, and the provision that at the end of four years slack coal may be supplied instead of run-of-mine.

Trade Publications.

Cold Saw.—The cold saw made by John T. Burr & Son, Kent avenue and South Sixth street, Brooklyn, N. Y., will cut off round, square or other shaped stock up to 3½ inches round. It is a well built, efficient tool, using a 10-inch saw driven by a powerful system of gearing. It has ample power and stiffness to cut off as fast as the saw can be fed. With each machine is furnished an efficient saw grinding attachment. The carriage has a bearing 10 inches long on the bed, is gibbed its whole length, and carries a saw arbor which is of large diameter and has a bearing of 8½ inches. The carriage is drawn back from the vise in an instant by a lever, and latches when in this extreme position. The drive consists of a splined rod of a proper size, parallel to the bed, to which is feathered a steel worm of large diameter, carried in a worm bracket attached to the carriage. The worm is provided with an approved ball thrust bearing and meshes with a hobbed worm wheel, and then, through a pair of machinery steel pinions of wide face, drives the saw arbor.

Biography of Peter Cooper.—In the series of condensed biographies which Wyman & Gordon of Worcester, Mass., are issuing, from the pen of Dwight Goddard, the latest number is a short story of the life of Peter Cooper. This is indeed a most interesting story, being interspersed with incidents which mark epochs in the iron industry of this country. The manner in which Mr. Goddard relates it is as pleasing as it is instructive. An excellent portrait of Peter Cooper is reproduced in the frontispiece

Dynamos and Spark Coils.—The latest catalogue by the American Coil Company, West Somerville, Mass., deals with their Little Giant dynamos and coils, both of which are intended for sparking purposes. In these coils the primary winding is of sufficient resistance to insure the longest possible life of the battery. Next, there are at least 5000 feet of wire in the secondary winding, which is put on in such a way as to give the largest possible number of turns as it is the turns and not the length of the wire which count. In addition, the insulation is perfect in all parts of the coil. The condenser is well made, of the best material and of sufficient size to operate the coil to the best advantage. Their No. 0 box coil is placed in a hard wood case measuring 7¾ x 3½ x 4⅝ inches and weighs 4¾ pounds. It is intended for automobiles, launches and stationary work and can be operated with three dry cells.

Water Wheel Governors.—The extensive adoption of the water wheel governor made by the Sturgess Governor Engineering Company, West Troy, N. Y., and their successful operation in every plant in which they have been installed are clear demonstrations of their many points of superiority and the correctness of the principle upon which they are built. This governor is of the hydraulic class, all the movements being produced by fluid pressure. This fluid may be either oil or water, the former being usually adopted when low heads are employed and the latter where the heads exceed 100 feet. The governor consists of four elements or groups or parts—namely, a hydraulic cylinder having a shaft and piston adapted to move the gate, a hydraulically operated main valve for admitting pressure to the hydraulic cylinder and a centrifugal governor which controls the main valve, causing it to open in a direction which shall produce a closing movement of the water wheel gate when the speed is too high or an opening movement when the speed is too low. When the speed is normal the valve is held in its middle position so that no movement of the gate takes place. Finally, there is a secondary controller which determines the amount the gate shall open for a given variation in the load. These governors are noted for the closeness of speed regulation, their reliability and endurance and their simplicity of construction.

Steam Engines.—A very handsome catalogue has been received from the William Tod Company of Youngstown, Ohio, describing their blowing, Corliss, reversing and automatic engines for rolling mill and electric car service. The blowing engine they built for the Ohio steel Company is probably the largest engine of this type in the world, the total weight of one engine being 1,270,000 pounds. The steam cylinders are 58 inches and 108 inches in diameter by 60 inches stroke, while the air cylinders are 108 inches in diameter, with the same stroke. This is the most modern and economical type of blowing engine, being equipped with Corliss valve gear for the steam cylinders and mechanically operated metallic valves for the air cylinders. This valve motion is also used on other types of the Tod blowing engine, such as the vertical walking beam engine and the long cross head engine. Their reversing mill engines are of very massive proportions throughout, the bed plates being cast in one piece and strongly ribbed and rigidly tied together at both ends with heavy tie pieces. These engines are all equipped with piston valves provided with packing rings and removable bushings, making a perfectly tight valve and reducing the wear and friction to a minimum.

Compressors.—We have received advance sheets of the 1904 catalogue of the Blaisdell Machinery Company of Bradford, Pa., describing their air and gas compressors, which are made in capacities up to 2000 feet. These compressors are driven by steam, belt or electric motor and are made both single and duplex.

Arbor Press.—The Greenerd arbor press, made by Edwin E. Bartlett, 364 Atlantic avenue, Boston, Mass., is described in a pamphlet just issued. Their No. 3 press takes work 12 inches in diameter and arbors or mandrels 1½ inches in diameter, and is the size commonly used in connection with 14 or 16 inch lathes. The leverage is 45 to 1. As the machine weighs but 90 pounds it can be easily moved from place to place in the shop, so as to have it close to the workman. The larger sized presses differ from the smaller inasmuch as the lever can be used where most effective. This is accomplished by means of a pawl and ratchet, the ratchet being keyed fast to the pinion, while the pawl is held in the casting that forms part of the lever. The lever casting is free on the pinion shaft and the lever is counterbalanced, which holds it upright, and when in this position the pawl does not engage the ratchet and the rack or ram is free to be moved by means of a hand wheel.

We have received from Baeder, Adamson & Co. of Philadelphia a pamphlet describing their method of insulating buildings, particularly those devoted to cold storage and refrigerating purposes. This consists in providing the walls and partitions with hair felt, 3 inches of which will form as good insulation as 6 inches of shavings or mineral wool.

George G. Blackwell, Sons & Co., Limited, Liverpool, England, now supply about 25,000 tons of fluor spar yearly from their own mines. The quality of the fluor spar produced is the best and it is graded for every purpose. A handsomely illustrated circular gives some interesting points regarding their mining operations.

OBITUARY.

RICHARD BROWN, who for many years was a leading iron manufacturer of Youngstown, Ohio, and who died on September 8, was for several years during his youth a roller in the mills at New Castle, Pa. In 1855 he went with his three brothers, also New Castle iron workers, to Youngstown to look over a mill owned by the Wick brothers of that town. It had been idle for several years and was badly out of repair. The Browns had almost no money, but they "thought they could make iron," and events proved that they could. They bargained to take the old plant off the hands of the Wicks at $100,000, of which amount they were to pay $25,000 per year for four years. They took William Bonnell and James Westermann in with them and formed a company. This little enterprise grew into the great Brown-Bonnell plant, which became a few years ago an important part of the Republic Iron & Steel Company. Mr. Brown was one of Youngstown's best and most influential men. Many of the most experienced iron workers of to-day in Youngstown are descendants of the 40 families who went from New Castle to Youngstown in 1855 with the Brown Brothers to start up the old and decaying mill, then regarded as little more than a pile of junk.

BRONSON B. TUTTLE of Naugatuck, Conn., died on September 12 from a stroke of apoplexy, at his summer home, at Middlebury, Conn., aged 68 years. As senior member of the firm of Tuttle & Whittemore, now the Naugatuck Iron Works, he had manufacturing interests in Naugatuck, Troy, N. Y., Cleveland, Ohio, and elsewhere. He retired from active business some years ago.

NATHAN WASHBURN, the inventor of the steel tired Washburn car wheel, one of the most important inventions connected with modern railroading, died at his home in Stafford Springs, Conn., on September 15. He was 85 years old, and was born in Stafford. In 1844 he established a foundry in Stafford and perfected the process.

HARRY CHESTON VANSANT, manager of the National Tube department of the United States Steel Corporation in Philadelphia, Pa., died on September 15 at his residence in that city, after a brief illness, aged 43 years. He was born in Mount Holly, N. J., and when 17 years of age entered the employ of Morris, Tasker & Co. in Philadelphia, rising to the secretaryship of the company, which position he held when the concern were incorporated in the National Tube Company, one of the constituent companies of the United States Steel Corporation when he was selected as manager of the Philadelphia district of the corporation.

Wilhelm Leicht and Lanno Andrien, who are connected with an Austrian syndicate operating iron mines and blast furnaces in Austria, were in Cleveland last week inspecting the plant of the Brown Hoisting Machinery Company, together with other manufacturing plants in that city. They will spend several months in this country and expect to inspect American engineering methods in other cities.

Press dispatches state that the Creusot Company, one of the largest iron and steel manufacturers in France, propose to construct a blast furnace in Chile.

MANUFACTURING.

Iron and Steel.

At the recent annual meeting of the James A. Spargo Wire Company, Rome, N. Y., the following officers and directors were elected: James A. Spargo, president and general manager; John T. Wiggins, vice-president; John Baynes, secretary and treasurer; John D. McMahon, Fred. M. Shelley and William J. Doyle.

The Lackawanna Iron & Steel Company have prepared their two furnaces—one at North Cornwall, Pa., and one at Colebrook, Pa.—for blowing in. The furnaces have been relined and increased in capacity. The two furnaces of the Lackawanna Company now in operation—one at Cornwall and the other at Colebrook—have ceased to use green ore and are using of the large stored supply of roasted ore the company have on hand. This supply is sufficient to operate the furnaces for several months. As a result there has been a partial suspension of work at the Cornwall ore mines. The shutting down of one blast furnace of the Pennsylvania Steel Company, at North Lebanon, has been another reason for the partial suspension at the mines. The Lebanon Valley furnace, in Lebanon, the small stack at North Lebanon and the Robesonia Furnace are about the only stacks demanding green Cornwall ore at present. This is less than half the normal demand. The demand for ore for the furnaces in and about Lebanon is not active, owing to overproduction of pig iron. Whether or not the blowing in of the three idle furnaces of the Lackawanna Company will come next month depends on the price of pig iron, but the operation of the big mills of the company in Buffalo is hoped to result in their operation.

It is expected that the Eastern Steel Company, Pottsville, Pa., will start up four open hearth furnaces January 1.

The National Rolling Mill Company, Hartford City, Ind., have arranged to move their plant to Vincennes.

At Ironton, Ohio, John Peters, Jr., has filed a petition asking that a receiver be appointed for the Lawrence Furnace Company, operating a blast furnace at Ironton, conditional upon their paying him $9700, which he claims is due him.

The Liggett Spring & Axle Company, whose works were formerly located at Allegheny, Pa., have about completed the building of their new plant, at Axleton, on the Monongahela River, above Elizabeth, Pa. They expect to have this new plant in full operation in October, and the equipment is now being removed from the old plant to the new works.

The new open hearth plant of the United Steel Company, Canton, Ohio, will probably not be put in operation for several weeks. While the open hearth furnaces are practically completed, the blooming and plate mill department is being delayed by the nondelivery of certain machinery, which may mean a delay of from four to six weeks.

Old Alcalde Furnace, at Rusk, Texas, is being enlarged to 65 x 12½ feet, and three hot blast stoves and a battery of Stirling boilers are being installed. The stack is expected to go in blast about April 1, 1904. Robert Miller has been appointed manager of the iron industry of the State of Texas, with headquarters at Rusk.

It is reported that the Canton Crucible Steel Company, at Canton, Ohio, have changed hands. A number of Cleveland parties have secured a controlling interest in the plant.

General Machinery.

The H. K. Porter Company of Pittsburgh, builders of light locomotives, have bought 2½ acres of ground adjacent to their plant, which will be used by the company in making extensive additions to their present works. The ground was bought from the American Bridge Company and is very desirable manufacturing property.

The American Machine Company of Painesville, Ohio, have executed a deed of assignment to the Cleveland Trust Company for the protection of creditors. No statement of liabilities or assets has yet been made.

The F. E. Reed Company of Worcester, Mass., are building an addition to their shops, to be devoted to a planer room. Large machines will be installed.

The Sanitary Laundry Machine Company of Tell City, Ind., have been incorporated with $30,000 capital, with Walter E. Bassett, Alvis N. Verdin, Chas. G. Bassett and Wm. Igler as directors.

The new machine shop of the Landis Tool Company of Waynesboro, Pa., is nearly completed, and much of the new machinery has been installed. A new 20-ton crane has been installed.

The Western Electric Company, who will eventually expend from $5,000,000 to $7,000,000 in the construction of a plant at Hawthorne, south of Twenty-second street and east of Forty-eighth avenue, Chicago, details of which have been given, are making rapid progress with the construction work, nine buildings being already under way, the contracts for which aggregate $1,207,247. In addition to the buildings which are now being erected, a number of important contracts have been let, amounting to $160,000. These include 2½ miles of cast iron pipe for fire protection of the buildings; sidewalks and curbing about 2 miles in extent; 4½ miles of standard railway tracks; about 2 miles of brick sewers and surface drains; elevated tracks on trestle work, and about 3 miles of fences. A reservoir having a capacity of 5,000,000 gallons will be constructed for fire purposes, for use in connection with condensing engines, and for emergencies in case of shortage of water supply from any source. Work on the contracts which have already been let is expected to be completed by February, 1904.

The Chicago, Burlington & Quincy Railroad are preparing to install three new coal chutes of the ordinary cable and hoist type, 20 per cent. incline, at an approximate cost of $20,000 each. The installations will be made at Savannah, Ill.; Grand Crossing, Wis., and Hastings, Iowa.

The Gillette Roller Bearing Company, Grand Rapids, Mich., have purchased the Reelman property, at Granville avenue and Prescott street, where they intend to erect a new plant. While they are now in the market for only a small quantity of machinery, they will purchase considerable later in the winter, as it is their intention to begin building operations early next spring.

The J. K. Krieg Company, Boston, Mass., have incorporated for the manufacture of shoe machinery, tools and implements. The company are taking up an existing plant.

The New Castle Forge & Bolt Company of New Castle have been very much delayed in getting their new building completed. The building is a structural steel frame and was to have been up in August, but it will scarcely be completed by October 1. Considerable of the machinery for the building has already arrived and will be placed in position as soon as the roof is put on.

Circuit Judge Tappan has issued an order for the sale of the plant of the Columbia Iron Works, St. Clair, Mich., September 18.

A number of departments of the large shops of the Pennsylvania Railroad at Altoona, Pa., have been ordered to operate 13 hours daily for four days of the week and the usual hours on the other two days. The shops are crowded with work and about 2000 men are affected by the new order.

The Toledo Railways & Light Company of Toledo, Ohio, have awarded a contract for the erection in East Toledo of a steel and brick car house and repair shop to take care of their cars running to that portion of the city. The building will be 80 x 240 feet, divided into three sections.

Newspaper reports from Akron, Ohio, stated recently that owing to inadequate fire protection due to the fact that the streets leading to the plant had not been paved, that there was a probability that the South Akron plant of the Wellman-Seaver-Morgan Company of Cleveland would be dismantled and moved to Cleveland. Cleveland officials of the company state that there is no foundation for this report and that the street in question is soon to be paved.

The Gas Machinery Company of Cleveland, manufacturers of gas machinery, have placed a contract for the erection at Collinwood, a short distance from Cleveland, of a factory building 80 x 100 feet. Skeel Brothers of Cleveland have the contract.

The National Iron & Wire Company of Cleveland, who recently completed a large factory building, have placed a contract for another addition. It will be brick and steel, two stories high, and 80 x 300 feet. They are also installing a power plant and will operate all machinery by electric motors. They will install considerable new machinery in the new building.

Contract has been let to Wm. Scaife & Sons, Pittsburgh, Pa., for the structural steel machine shop building, covering a total floor space of 25,560 square feet, to be erected immediately at St. Mary's, Ohio, for the Heisler Mfg. Company, and to be used for the manufacture of air compressors and pumping machinery. The selling and engineering office of this company is located in the Westinghouse Building, Pittsburgh.

Power Plant Equipment.

The Indiana Hydraulic Power Company of Hindostan, Ind., have been incorporated with $150,000 capital, to construct and operate a water plant at the Hindostan Falls, and to construct a dam on White River. The plant will be used to generate hydraulic and electrical power for manufacturing purposes. The directors are: Jerome Herff and Joseph Bergman, Peru, Ind., and Wm. A. Cullop, Vincennes, Ind.

The Buffalo Forge Company last week shipped to the Omaha & Council Bluffs Street Railway Company for their new power house two 320-inch full housing steel plate fans, having discharge orifices 5 feet 6 inches x 9 feet 8 inches, with blast wheels 18 feet in diameter, each driven by a 14 inch x 14 inch Buffalo horizontal center crank, Class A, engine, and will be used in connection with Green fuel economizers.

James Knox Taylor, supervising architect, Treasury Department, Washington, will receive bids until October 12 for a low pressure steam heating plant for the United States Court House, Post Office and Custom House, at Tampa, Fla.

Bids will be received at the office of the United States Engineer, Washington Barracks, D. C., until October 5 for a heating apparatus and plumbing fixtures.

The Cleveland Engineering Company of Cleveland are preparing plans for a large central heat, light and power station to be erected in the business section of Cleveland. The project is promoted by W. F. Black, with headquarters in the Electric

Building, that city, who has completed arrangements with a number of capitalists to finance the project. The plant is to be erected in the business district bounded by Euclid avenue, Sheriff street, Ontario street and Prospect street, and it is proposed to furnish steam heat and electric light and power to all the buildings in this block. A similar plan has recently been placed in operation by the owner of a number of large power and business blocks in the business section of Cleveland. The plant will cost about $150,000, and a site has already been secured.

Mayor Young of Cuyahoga Falls, Ohio, claims that a number of Eastern capitalists have become interested in a project promoted by local people to establish a water power plant in the Cuyahoga River near Cuyahoga Falls. There is a considerable fall in the river and a large amount of power could be obtained at all seasons of the year. The site is a desirable one, being only 8 miles from Akron and but 20 miles from Cleveland. The large manufacturing plants in Cuyahoga Falls could also be depended upon to take considerable power. It is estimated that the required plant would cost about $1,000,000.

Foundries.

Cupola, blower and tumblers are required by the Dobson Mfg. Company, Rockford, Ill., for their proposed new foundry, 70 x 180 feet.

The S. Obermayer Company, Cincinnati, Ohio, manufacturers of foundry facings and supplies, report good business, their three plants still running 20 hours per day. Their new No. 40 catalogue is now in the hands of the printers and will be ready for distribuntion in about 30 days. This catalogue will be a 400-page book, 6 x 9 inches, and is expected to be the most complete and comprehensive of its kind ever published. This catalogue will illustrate and describe every modern, new and up to date appliance connected with either gray, malleable iron, steel or bras foundry. This catalogue will be sent free on application.

The Richland Foundry Company, Belleville, Ill., have taken out a permit for the erection of their new $10,000 foundry. There will be two buildings, one 60 x 150 feet and the other 30 x 80 feet. The company are not at present in the market for any machinery.

Walter Barber, president of the Ideal Stove & Foundry Company of Daleville, Ind., whose plant was totally destroyed by fire September 7, says that the loss was so heavy that the rebuilding of the plant will depend on outside assistance. The loss was estimated at $60,000, with $20,0000 insurance. The plant was owned by Barber Bros. and was moved to Daleville from Piqua, Ohio. There was a large amount of stock on hand ready for shipment, and the foundry was behind orders. Among the finished product destroyed were 287 stoves for the Chicago Stove & Range Company.

The Toledo Co-operative Foundry Company of Toledo are about to commence operation in their newly erected foundry. The company control certain patents, involving the manufacture of an anti-friction metal which is designed for use in railway journal boxes, taking the place of brass journals. They claim to have contracts on hand which will keep the plant busy for some time to come.

The Butler Foundry & Machine Company have been organized at Butler, Pa., and will build a large plant for the manufacture of several of the inventions of Peter F. McCool, who is connected with the Standard Steel Car Company, at Butler. The new concern have been incorporated with a capital of $500,000. Peter F. McCool is president and Charles Gettman is vice-president. The new plant will have three main buildings—one a steel foundry, 150 x 300 feet; a gray iron foundry, 100 x 200 feet, and a plant for supplying electrical power, located in a building 60 x 200 feet. Building lots have been plotted to be sold to employees who wish to build homes near the works. The new plant is expected to be in operation early in the new year. A boltless rail chain and a new M. C. B. car coupler are two of the principal articles that are to be made in the new plant.

Bridges and Buildings.

The Fort Pitt Bridge Company of Pittsburgh have been awarded the contract for the construction of the rolling mill and open hearth buildings of the new plant of Sweet's Steel Company, at Williamsport, Pa.

The York Bridge Company, York, Pa., have received the contract for the building of two steel bridges in Cecil County, Maryland, in the face of active competition.

The first statement of the receiver of the Wabash Bridge & Iron Company, Wabash, Ind., shows that the liabilities will reach at least $275,000, while the appraisers' report on the property in sight shows assets of about $86,000, exclusive of book accounts which may amount to $3000 to $4000. The plant was valued by the appraisers at $50,000 and the completed work and stock on hand at $36,000. The completed work is assigned to secure notes. The Central Trust Company of Cleveland and local creditors have filed a petition in bankruptcy against the company and forced a shutdown of the plant.

The Warren County Council, at Williamsport, Ind., has appropriated $95,000 for two iron bridges over the Wabash.

The Cruse-Kemper Company, Ambler, Pa., who recently leased the plant of the Pettit Ornamental Iron & Fence Company, will build a two-story stone and steel addition, 60 x 150 feet, which will be modernly equipped for the manufacture of gas holders, tanks, &c., and for the handling of heavy structural iron.

Fires.

The chemical plant of the Barrett Mfg. Company, Shady Side, N. J., was destroyed by fire September 15, entailing a loss of about $75,000.

The plant of the Rasin Monumental Fertilizer Company, Fairfield, Md., was burned September 15. The loss is estimated at $500,000.

The plant of the Blue Grass Stove & Iron Company, Lexington, Ky., was recently destroyed by fire. The loss was placed at $50,000.

The Le Roy Plow Works, Le Roy, N. Y., were recently destroyed by fire, entailing a loss of about $75,000.

The Bradley-Burr Company's carriage and wagon works, Chicago, Ill., were burned September 10, causing a loss of $30,000.

The Brass foundry of Hertzog & Orr, Lancaster, Pa., was destroyed by fire September 10.

The plant of the Southern Foundry Company, Owensboro, Ky., was recently almost destroyed by fire. The loss is placed at $20,000.

Hardware.

The Vitrified Wheel Company of Westfield, Mass., are pushing their new line of Canada corundum wheels, the material for which is from the Craig mines.

A. H. Warner & Co. of Bristol, Conn., are getting out a new line of bead looms to supply the demand caused by the bead fad.

The Wallace Barnes Company of Bristol, Conn., are building a one-story brick addition to their plant, 36 x 150 feet. One-half of the new building will be devoted to extending their tempering department and for additional hammers for their drop forge department. The other half will be given over to the clock spring department, which will be doubled. This half of the new building has walls designed to take another story when the demands of the business shall require it. Instead of increasing their power plant the company will operate the machinery of the new building with electric power from outside. It is probable that the company will increase their stock room by the erection of a new building.

J. H. Sessions & Son of Bristol, Conn., manufacturers of trunk hardware, have bought a tract of 27 acres of land in Bristol and propose to erect a new plant upon the premises. The new property is in two sections of 23 and 4 acres, separated only by the railroad. The new plant will be upon the smaller tract, the larger being in part suitable for residential purposes. The old plant will be abandoned as soon as the new is ready for occupancy. The business has increased greatly until it has become necessary to provide much larger quarters, which will be found in the new buildings. The current report in Bristol that the firm will erect a foundry to provide their own castings is not with good foundation, although it is possible that such will be the final plan. It is not determined when the work on the new buildings will begin.

W. L. Barrett, manufacturer of glass cutters and soldering sets, at Bristol, Conn., is soon to move into his new brick shop, which will give much larger quarters for a growing business.

The American Silver Company of Bristol, Conn., are now manufacturing full lines of table cutlery, in pearl, celluloid and stag.

The capital stock of the Racine Steel & Iron Mfg. Company, Racine, Wis., has been increased from $125,000 to $250,000. The plant is being enlarged by the construction of new buildings and the installation of new machinery, which has been found necessary to take care of the rapidly growing business. Wagon skeins will continue to be the principal product, and the company are now preparing to make a large business of jack screws, anvils and heavy hardware.

The Tuthill Spring Company of Chicago were visited by fire on August 17, which destroyed their building and damaged their machinery to the extent of $20,000. They are now rebuilding in a much more substantial manner and are already executing orders.

The announcement in our issue of the 3d inst. that a new company had been formed at Buffalo, N. Y., to manufacture wire goods, was incorrect as to the name. The corporate name of the new company is the Western Wire Goods Company. C. K. Hutchins, the secretary and general sales agent of the company, was formerly with the Wire Goods Company of Worcester, Mass., and the superintendent, A. H. Dean, was formerly connected with the Kilbourne Wire Works of Troy, N. Y. The company will manufacture many specialties in wire goods as well as a full line of general wire goods for the hardware trade.

For the Hendricks Patent Automatic Sash Lock & Hinge Company, lately organized with a plant in Waynesboro, Pa., Superintendent Hendricks says that within the next few weeks the plant will be turning out 100 sets of sash locks and hinges a day.

It is announced by J. H. Smith & Co. of Muncie, Ind., that their bending works will be moved to Anderson to operate in conjunction with the Buckeye Mfg. Company, both plants being owned by the Pioneer Pole & Shaft Company.

Miscellaneous.

The G. H. Peters Company, metal workers, Buffalo, N. Y., have just completed a large two-story addition to their plant on Oak street, and have also added a handsome two-story office building of brick.

The South Atlantic Car & Mfg. Company, Waycross, Ga., have their new plant in operation. They completed the buildings in July and installed the latest and most improved machinery for building freight and caboose cars. The capacity is ten cars per day. The company have an order for 500 80,000-pounds capacity box cars from the National Railway Company of Mexico, and will make delivery of about 100 in September and the balance by January 1.

At a meeting of the Board of Estimate and Apportionment, New York, September 2, resolutions were adopted appropriating $33,000 for the development and extension of the city's incinerating plants for the disposition of garbage. Of the amount $30,000 is desired for the enlargement and extension of the plant at the foot of Stanton street, and $3000 for a new dynamo for the plant at the foot of West Forty-seventh street.

The Du Quesne Motor Car Company, recently incorporated at Buffalo, N. Y., have located their factory at 54 to 60 Broadway, that city.

The Standard Stove & Range Company of Pittsburgh have applied for a charter to manufacture stoves and ranges. The incorporators are John McClurg, Abram Wall and Willard W. Patton.

The stockholders of the Pittsburgh Stove & Range Company met last week in their offices in Allegheny, Pa., and elected the following directors: John B. Jackson, John B. Nicholson, A. M. Neeper, John W. J. Bissell, Samuel R. Baldwin, James F. McKee and John S. Graham. The directors are all residents of Pittsburgh with the exception of Mr. Baldwin, who resides in New Castle.

The Structural Steel Car Company, at Canton, Ohio, who recently went into the hands of a receiver, have filed a statement of their condition, which shows liabilities of $70,500, with assets of $207.62.

The Dunbar Furnace Company, Dunbar, Pa., manufacturers of high grade pig iron, Connellsville coke, and shippers of bituminous coal, closed a contract with the L. & R. Wister Company of Philadelphia for the building of a plant at Dunbar, by which the furnace slag will be converted into roofing material.

The Tehuantepec Mutual Planters' Company of Chicago report that by unanimous vote of the stockholders the capital stock of the company has been increased from $100,000 to $500,000, the purpose of the increase being to provide funds for the erection of a central sugar house and mill, the building of tramways, construction of irrigation plans, and for prospecting for oil upon the property, and other improvements. The purchase of machinery will not be made until about May 1, 1904. In the meantime plans are being prepared. The company have recently removed from 700 Journal Building to Fort Dearborn Building, Clark and Monroe streets, Chicago.

Recent orders for Cross oil filters received by the Burt Mfg. Company, Akron, Ohio, include Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., fourth order; Cleveland Electric Illuminating Company, Cleveland, Ohio, duplicate order for 200-gallon filter, with automatic water separating device; American Sheet Steel Company, New York, twenty-first order; Witten, Germany, 18 filters; Buenos Aires, Argentine Republic, four filters. The Baldwin Locomotive Works, Philadelphia, have just sent their thirteenth order for Burt exhaust heads; the Utah Light & Power Company, Salt Lake City, have equipped their plant with Burt exhaust heads; two 15-inch and one 12-inch were recently shipped to the American Steel & Wire Company, at Worcester, Mass., and 16 were recently shipped to London, England.

The American Voting Machine Company have been incorporated at Buffalo, N. Y., with a capital stock of $100,000, and will manufacture voting machines under patents held by one of the members of the company. The directors are W. C. Townsend, J. J. Lanahan and C. B. Lang, all of Buffalo.

The Gettysburg Mining Company, with headquarters in Harrisburg, Pa., have been chartered to mine ore, coal and stone and to manufacture iron. The capital stock is $15,000, and the incorporators are H. E. Snyder, J. D. Snyder, E. L. Rinkenbach, J. H. Collins, B. F. Meckley, L. W. Walzer and F. S. Whitmoyer, of Harrisburg, Pa.

Alfred W. Lewin has leased a factory building in Harrisburg, Pa., and will manufacture composite metal products.

The United Lead Company, successors to Markle Lead Works, St. Louis, Mo., have purchased a desirable site at Granite City, Ill., comprising 30 acres of ground, upon which they will immediately begin the erection of a large factory for the manufacture of all forms of lead. The plant will have a capacity of 150,000 tons per annum, manufacturing white lead by all the most approved processes, including the Bailey, Carter and Old Dutch; red lead, litharge and by-products; lead pipe of all kinds; traps, bends and other plumbers' goods, and sheet lead. The company already have in operation at Granite City a factory for the manufacture of shot, blackbirds (clay pigeons) and sealing wax. The new works will be modern in every way and equipped throughout with electrically driven machinery. Barton Sewell is president of the company, E. R. Hoyt vice-president, F. W. Hills secretary and Thos. J. Phillips treasurer.

The Scott Mining Company have been incorporated at Menominee, Mich., to mine, smelt and manufacture iron ore and other minerals in Delta and Marquette counties, Mich. The capital stock of the new company is $125,000. The incorporators are Thomas Verville, Frank Spies and John M. Thompson. A shaft will soon be sunk and mining begun.

The factory buildings of the Marion Insulated Wire & Rubber Company, Marion, Ind., are now nearly ready for roofing. The boilers, three units of 200 horse-power each, are in place, and foundations are being erected for the heavy machinery to be installed. All heavy machinery on the first floor will be driven from line shafting direct connected to a 22 x 42 inch Corliss engine. Elevators and all machinery on the second and third floors will be operated by electricity.

The Omaha Safe & Iron Works, Omaha, Neb., have recently received the contract for supplying iron fire shutters and other steel work at the Fort Worth, Texas, plant of Swift & Co. The contract aggregates about $7000. This company also supplied the doors and shutters for Armour & Co.'s new plant, at Fort Worth, the contract price being $20,000.

The Magnolia Metal Company, New York, have moved back to their old factory, at 113-115 Bank street, which was destroyed by fire about a year ago, and which they have rebuilt.

Frismuth Bro. & Co., Philadelphia, Pa., have purchased a plot of ground at Seventeenth street and Glenwood avenue, where they will erect a plant for the manufacture of tobacco. Plans are not yet completed, and it is not yet known just what machinery will be required.

The Penn Gas Coal Company of Pittsburgh and Irwin have decided to increase their capital stock from $1,500,000 to $2,000,000 as occasion requires. The purpose of the increase is not to obtain control of any other company, but to provide for future extensions of the plant and operations, as the growth of business may make them necessary.

The Toledo Belting Company of Toledo have completed negotiations with R. J. Law whereby the latter will build a large manufacturing establishment, a large portion of which will be occupied by the Toledo Belting Company. The company were organized a short time ago as a partnership composed of J. W. McKenzie, C. R. Ritter, Charles F. Fowler and E. I. Peck. They propose shortly to incorporate with increased capital, and they expect to add a department for finishing their own leather.

The Crescent Appliance Company of Cleveland have secured a large building site at Berea, Ohio, and will erect a large factory in that village. They manufacture railway torpedoes and other explosives.

On Monday of this week the Niagara Falls Hydraulic Power & Mfg. Company began the transmission of power to the new industrial center on the northern outskirts of that city. It is in this new section that the fine new plant of the Carter-Crume Company, manufacturers of check books, has been established. The first transmission was 150 horse-power, but this amount of force will be increased as the machinery is installed in the first new factory. To give a power service to this new section the Niagara Falls Hydraulic Power & Mfg. Company have erected a new transformer house and installed a new series of transformers of Westinghouse make. The generator that supplies the current is of Bullock make. It is a 1000 kw. 11,000 volt machine, three phase, and is operated by one of the turbines in the power house at the water's edge.

The annual meeting of the stockholders of the National Steel & Wire Company was held at Portland, Maine, on September 8. All the nine directors were re-elected except Frank L. Brown, the new member of the board being M. L. Requa of San Francisco. The Board of Directors organized by the election of E. B. Webster of Boston, president; E. F. Shellaberger of De Kalb, Ill., vice-president; H. Sanborn Smith of New Haven, Conn., secretary, and E. R. Hastings of Boston, treasurer.

Shipments of coal and coke originating on the Pennsylvania lines east of Pittsburgh and Erie for the year to September 5 show an increase of 10 per cent. over last year. The shipments for the year to September 5 have been 28,604,183 tons, an increase of 2,702,547 tons. A large volume of business is now moving. The anthracite hauled in the week ending September 5 amounted to 72,998 tons, the bituminous coal to 558,970 tons and the coke to 186,447 tons. The total coal and coke tonnage for the week was 818,415 tons.

The Iron and Metal Trades.

While it is undoubtedly true that more Pig Iron is being purchased at present than at any other time since early in the spring, the demand is not sufficient to take up the slack completely. The consumption is large, but the production is larger. We are dealing with huge figures these days, and while the consumption may be at the rate of 19,000,000 tons per annum the production is running larger than this, and therefore producers are competing actively for current business.

The most important development of the week has been the renewed effort put forth by Southern Pig Iron producers to secure a larger share of the trade of Eastern foundrymen. A special price has been named to Eastern buyers in the hope that this might induce them to make larger purchases of Southern Iron. As far as can be learned this has not led to any considerable business. Although Northern furnaces generally may not be able to meet this price without incurring some loss, yet there are a few who are unwilling to let such business be taken by outside interests, and are meeting the competition. A fact which militates against the placing of much Eastern business with Southern producers is the urgency with which buyers desire their Iron delivered. They place orders on which they generally desire shipment to begin immediately, and almost expect tracers to be sent after each car.

The members of the Steel Billet pool will meet in this city on Thursday to consider the conditions affecting the Billet market. A large block of Canadian Billets has just been sold for delivery at a New England point at a shade under $26, and some of the domestic Billet makers who are not members of the pool are also naming prices which are under the schedule. It hardly seems likely that these matters will be completely overlooked. Inquiries for Billets are reported to be increasing, and a much larger volume of business is in prospect.

A branch of trade in which the outlook is decidedly promising for heavy business is the structural line. Contracts are pending which will probably be placed before the close of the month for about 100,000 tons. The most prominent among these are the Blackwell's Island bridge in this city, to take not far from 50,000 tons, and the terminal improvements of the New York Central, also in this city, which will take 30,000 tons. The local labor troubles in the building trades are unquestionably about settled, and many building projects which have been held up will be immediately put in hand.

The Wire trade is enjoying a much more active demand, Wire Nails and Fencing Wire being in particularly good request. Buyers in these lines have been carrying very small stocks and are now compelled to purchase freely.

The general quietness of trade in some forms of Finished Steel gives rise to the belief that more determined efforts will be made in the near future to secure a larger share of foreign business. Some important negotiations are in fact reported to be under way.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Sept.16, 1903.	Sept.9, 1903.	Aug.19, 1903.	Sept.17, 1902.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$16.00*	$16.25	$16.75	$22.00
Foundry Pig No. 2, Southern, Cincinnati	*14.75*	14.75	15.25	21.75
Foundry Pig No. 2, Local, Chicago	*16.00*	16.00	16.50	23.00
Bessemer Pig, Pittsburgh	*17.35*	17.35	17.85	21.75
Gray Forge, Pittsburgh	*15.50*	15.50	16.00	20.75
Lake Superior Charcoal, Chicago	*19.00*	19.00	21.00	26.00
BILLETS, RAILS, &c.:				
Steel Billets, Pittsburgh	27.00	27.00	27.00	29.00
Steel Billets, Philadelphia	28.00	28.00	28.00	26.50
Steel Billets, Chicago	28.00	28.00	28.00	30.00
Wire Rods, Pittsburgh	*34.50*	35.00	35.00	36.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	*14.50*	14.50	16.50	19.00
O. Steel Rails, Philadelphia	*16.00*	16.00	17.75	21.50
O. Iron Rails, Chicago	*18.00*	18.00	18.50	25.00
O. Iron Rails, Philadelphia	*19.00*	19.00	21.00	24.00
O. Car Wheels, Chicago	*21.00*	21.00	21.50	21.00
O. Car Wheels, Philadelphia	*18.00*	19.00	19.00	20.00
Heavy Steel Scrap, Pittsburgh	*16.50*	17.50	19.00	....
Heavy Steel Scrap, Chicago	*14.00*	14.00	15.00	18.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.60	1.60	1.60	1.92
Common Iron Bars, Chicago	*1.55*	1.55	1.60	1.90
Common Iron Bars, Pittsburgh	1.60	1.60	1.60	1.80
Steel Bars, Tidewater	1.73½	1.73½	1.70	2.00
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.60
Tank Plates, Tidewater	1.78	1.78	1.60	2.00
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.75
Beams, Tidewater	1.73½	1.73½	1.73½	Nom.
Beams, Pittsburgh	1.60	1.60	1.60	Nom.
Angles, Tidewater	1.73½	1.73½	1.73½	Nom.
Angles, Pittsburgh	1.60	1.60	1.60	Nom.
Skelp, Grooved Iron, Pittsburgh	1.80	1.80	1.82½	2.02½
Skelp, Sheared Iron, Pittsburgh	1.85	1.85	1.87½	2.10
Sheets, No. 27 Pittsburgh	*2.55*	2.55	2.60	2.85
Barb Wire, f.o.b. Pittsburgh	2.60	2.60	2.60	2.90
Wire Nails, f.o.b. Pittsburgh	2.00	2.00	2.00	2.05
Cut Nails, f.o.b. Pittsburgh	2.15	2.15	2.15	2.05
METALS:				
Copper, New York	*13.50*	13.62½	13.62½	11.70
Spelter, St. Louis	**5.65**	5.70	5.50	5.15
Lead, New York	**4.40**	4.12½	4.12½	4.10
Lead, St. Louis	**4.45**	4.25	4.10	3.97½
Tin, New York	27.40	26.60	27.80	26.35
Antimony, Hallett, New York	*6.25*	6.37½	6.37½	8.00
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.99	3.99	3.99	4.19

Chicago.

FISHER BUILDING, September 16, 1903.—(*By Telegraph.*)

Dullness has been the most prominent feature of trade in Steel, both intermediate and finished material, during the week. With the single exception of agricultural Steel, which has been sold a little more freely for 1903-1904 season, new business has been light. Buyers have continued extremely conservative, and in such lines as Bars, Plates, and even Structural Material business has been slow, largely because of the overpurchasing of last year, and what little improvement has been noted has been in specifications on old contracts. Even Rails and Track Supplies have been quiet with scarcely a transaction of moment throughout the entire week. Bar Iron has been in much the same condition as Steel, and trading in Pig Iron has continued to be confined largely to small amounts for early shipment. The few large buyers in the market hesitate to purchase at present prices, but producers of Foundry Irons are holding more firmly, while Bessemer grades and Basic Iron have yielded slightly for long delivery.

Pig Iron.—The prominent features noted a week ago continue to distinguish the trading in Pig Iron. Most of the buying is in small amounts for early delivery, there being few important transactions covering the remainder of the year, but there are some inquiries of moment for late delivery, and in some instances extending into the spring of 1904, but as yet these inquiries have resulted in but little business. Much of the trading which is being done is by analysis, and has to some extent obscured the actual market for fractured Iron sold by grade. This is especially true in the case of the agricultural implement manufacturers, machine founders and a few others who purchase Iron largely by an-

alysis. Pipe manufacturers are in the market for moderate amounts, and radiator makers continue to buy steadily from day to day in moderate quantities, failing as yet to cover requirements long in advance. Large buyers evidently still anticipate lower prices, being encouraged by the statistical position showing large production. On the other hand, producers seem determined to withstand any further concessions, as consumption is large, and from the active demand for quick shipment it is inferred that storage yards are bare. Already the margin of profit is narrow, and while Pig is relatively lower, prices for the finished product are being better maintained, although castings have declined somewhat in sympathy with raw material. Trading continues to be largely of the lower grades of Iron—of which there seems to be a surplus—and more for Foundry than for Bessemer grades. There has been a better demand for Basic Iron, however, and some transactions of moment. One Steel company who were forced into the market were obliged to pay $15 in the Valley for Basic Iron for immediate shipment. This is a shade under the $13 basis, Birmingham, but for late delivery it is offered on the basis of $11.75, Birmingham. With buyers bidding $11, it is probable that 5000 tons will be closed at between $11.25 and $11.50, Birmingham basis, for delivery during the remainder of the year. Malleable Bessemer has been very dull, but there has been a moderate inquiry for Standard Bessemer, with sales of 1000 tons on the basis of $17 to $17.25, Chicago. Among the largest sales of Foundry Iron were 3000 tons of No. 3 Southern Foundry at $11.25, Birmingham, and several 100-ton lots of No. 2 at $11.75 to $12, Birmingham, the higher price being for immediate shipment. Northern Iron has been moderately active and steady for the higher grades, but No. 3 and lower have been sold at concessions. Among the large sales have been 1800 tons of No. 3 Foundry in two lots at $15.50, Chicago, for September and October delivery. It should be noted that in the following table we recently changed the name "Local" to "Northern" Coke Foundry Iron. This was done to include prices of Northern Iron other than local, as recent changes in conditions at Chicago have left practically but one company whose Iron comes exclusively upon the general market. The name "Northern" is a broader term and includes "Local" Iron. The following are the approximate prices current, f.o.b. cars, Chicago, the outside being for quick shipment, and the inside for delivery during the last half of the year:

Lake Superior Charcoal	$19.00 to $20.00
Northern Coke Foundry, No. 1	16.50 to 17.00
Northern Coke Foundry, No. 2	16.00 to 16.50
Northern Coke Foundry, No. 3	15.50 to 16.00
Northern Scotch, No. 1	17.00 to 17.50
Ohio Strong Softeners, No. 1	17.50 to 18.00
Ohio Strong Softeners, No. 2	17.30 to 17.50
Southern Silvery, according to Silicon	17.10 to 18.10
Southern Coke, No. 1	16.35 to 16.85
Southern Coke, No. 2	16.10 to 16.35
Southern Coke, No. 3	15.35 to 15.85
Southern Coke, No. 1 Soft	16.35 to 16.85
Southern Coke, No. 2 Soft	15.85 to 16.35
Foundry Forge	14.85 to 15.35
Southern Gray Forge	14.35 to 14.85
Southern Mottled	13.85 to 14.35
Southern Charcoal Softeners, according to Silicon	18.85 to 19.85
Alabama and Georgia Car Wheel	25.35 to 26.35
Malleable Bessemer	17.00 to 17.25
Standard Bessemer	17.25 to 17.50
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon	19.30 to 21.30

Bars.—There has been a better inquiry for Bar Iron, both from manufacturers and jobbers, but sales have been largely confined to small lots. Among the most important sales have been 1000 tons purchased by carriage and wagon manufacturers on the basis of 1.55c., Chicago, for delivery extending into the spring of 1904. There has been some inquiry from railroads, but no important transactions. Jobbers are endeavoring to purchase on the basis of 1.50c., and there are rumors that this price has been made, but it cannot be substantiated, all mills in this section denying that they have sold below 1.55c., Chicago, basis. Some improvement in specifying on old contracts for Soft Steel Bars has been noted, but new business has been only moderate, aggregating only about 2000 tons for long delivery. There is a little better feeling in the market, however, due to the recent action of the Bar Association, which reaffirmed prices at 1.60c., Pittsburgh. The following are the prices current, f.o.b. cars, Chicago, mill shipment: Bar Iron, 1.55c. to 1.60c.; Soft Steel Bars, 1.76½c. to 1.86½c.; Hoops, 2.06½c. to 2.16½c.; Bessemer Bands, 1.76½c. to 1.86½c.; Angles, under 3 inches, 1.86½c. to 1.91½c., base. The merchant trade has continued moderate and the market has remained steady, Iron Bars selling at 1.90c. in carload lots, and 2c. to 2.10c. in less than carload lots. Soft Steel Bars sell at 2c. rates; Angles, under 3 inches, 2.10c. rates, and Hoops, 2.40c., base, from store.

Structural Material.—Dullness has been the most prominent feature of the market, there being but little business in sight in this locality—that is, for immediate placing; but there is considerable tonnage depending upon future developments. Prices, however, are well sustained, being as follows for mill shipment, Chicago: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. Some little improvement has been shown in the demand for Steel from local stocks and the market has remained steady, notwithstanding stocks are large and prompt shipments can be readily made; but prices are sustained as follows: Beams and Channels, 2.10c. to 2.25c.; Angles, 2.10c. to 2.25c.; Tees, 2.15c. to 2.30c., from local yards.

Plates.—Both boiler shops and shipbuilding companies are well supplied, and specifying on old contracts mainly, but sales during the week have improved slightly, aggregating between 800 and 1000 tons. Prices are well maintained, however, being f.o.b. cars, mill shipment, Chicago, as follows: Tank Steel, ¼ inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.; Marine, 1.95c. to 2.10c. The moderate demand for shipment from local stocks is readily supplied on the basis of the following prices: Steel, ¼ inch and heavier, 2c. to 2.15c.; Tank Steel, 3-16 inch, 2.10c. to 2.25c.; No. 8, 2.15c. to 2.30c.; No. 10, 2.30c. to 2.40c.; Flange Steel, 2.25c. to 2.40c., all f.o.b. warehouse, Chicago.

Sheets.—There has been a better inquiry for Black Sheets, and some trades of moderate amounts have been made at current quotations, while 125 tons have sold on even a lower basis It is reported that large Western buyers are negotiating direct at New York City for a considerable tonnage. In general the market is unsettled. Most of the trading is on the basis of the following quotations, f.o.b. cars, Chicago, for mill shipment: No. 10, 1.96½c. to 2.06½c.; No. 12, 2.06½c. to 2.16½c.; No. 14, 2.16½c. to 2.26½c.; No. 16, 2.26½c. to 2.36½c.; Nos. 18 and 20, 2.41½c. to 2.51½c.; Nos. 22 and 24, 2.51½c. to 2.61½c.; No. 26, 2.61½c. to 2.71½c.; No. 27, 2.71½c. to 2.81½c.; No. 28, 2.81½c. to 2.91½c. Small lots for shipment from local warehouses are selling at 10c. to 15c. over mill prices. Galvanized Sheets have continued in fair demand and are better sustained at 75, 10 and 2½ discount, mill shipment. Small lots sell from store at 75 and 2½ to 75 and 5 discount.

Cast Iron Pipe.—The market has continued quiet, business being confined to small mail orders from gas and water companies, there being few, if any, municipal contracts pending. All bids at Colorado Springs, Col., were rejected. While for round lots lower prices would be made, for the little business offering the following prices are well sustained, f.o.b. cars, Chicago: 4-inch, $31; 6 and 8 inch, $30; larger sizes, $29, in carload lots, for Water, and $1 per ton higher for Gas Pipe.

Billets.—There has been a moderate demand from Steel mills, with sales of 1000 tons of Bessemer Rerolling Billets at $28, Chicago, and Open Hearth are held at $29. Open Hearth Forging Billets are sold at $32 in carload lots, and $1 to $2 more for less than carload lots, according to analysis, buyer and time of delivery. Sales of about 15,000 tons of Canadian Bessemer Billets are noted on the Eastern seaboard.

Merchant Pipe.—The active demand for Merchant Pipe which has been experienced for many weeks has been largely to meet current requirements, there being little buying for stock, which must follow later. During the past week the demand has been less active, but the market has continued firm at the following schedule of discounts in carload lots, base, random lengths, mill shipment, Chicago:

	Steel Pipe.		Guaranteed Wrought Iron	
	Black.	Galvd.	Black.	Galvd.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛ to ¾ inch	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	70.35	60.35
7 to 12 inches	67.35	57.35	64.35	54.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—The situation is unchanged, mills being well supplied with orders, although distributers have placed fewer large orders. The market remains steady at the following schedule of discounts, mill shipment, f.o.b. cars, Chicago:

	Steel.	Iron.
1 to 1½ inches	40	35
1¾ to 2½ inches	55.85	35.85
2¾ to 5 inches	60.85	45.85
6 inches and larger	55.85	35.85

Less than carloads, 12½ per cent. advance.

There has been a moderate demand for shipment from local stocks, and prices have been well sustained at the following schedule of discounts from warehouses, Chicago:

	Steel.	Iron.
1 to 1½ inches	40	35
1¾ to 2½ inches	50	32½
2¾ to 5 inches	57½	42½
6 inches and larger	50	..

Merchant Steel.—A decided improvement has been noted in the sales of both Standard Steel and specialties, manufacturers of agricultural implements and wagons and carriages buying more freely, sales aggregating 4000 or 5000 tons for delivery during the 1903-1904 season. There has also been an improved demand for Shafting and Tool Steel, although there has continued to be keen competition for the latter. The following are the official prices current, f.o.b. cars, Chicago, mill shipment: Smooth Finished Machinery

Steel, 2.01½c. to 2.11½c.; Smooth Finished Tire, 1.96½c. to 2.11½c.; Open Hearth Spring Steel, 2.66½c. to 2.76½c.; Toe Calk, 2.31½c. to 2.46½c.; Sleigh Shoe, 1.86½c. to 1.96½c.; Cutter Shoe, 2.41½c. to 2.61½c. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 8c. for mill shipment; Specials, 12c upward. Cold Rolled Shafting in carload lots sells at 47 and in less than carload lots at 42 discount from list.

Rails and Track Supplies.—The market has been very quiet, there being little inquiry for 1904 delivery and less active demand for shipments during the current calendar year. Light Rails are easier, and are said to have been sold at slight concessions. Standard rails remain firm at $28, and second quality at $27, mill shipment. Light Rails are more freely offered, 30-lb. selling at $28, 12-lb. at $35, and differentials for intermediate sizes. Track Supplies have been in fair demand and steady at the following prices: Splice or Angle Bars, 2c. to 2.10c.; Spikes, 2.10c. to 2.15c.; Track Bolts, 3½ to 3¾ inches and larger, with Square Nuts, 2.85c. to 2.90c.; with Hexagon Nuts, 3c. to 3.10c. From store 10c. to 15c. over mill prices are asked and obtained.

Old Material.—The market has continued slow and easy for nearly all kinds, there being little demand from either mills or furnaces, but the offerings are less pressing, except for Relaying Rails, which are freely offered and difficult to sell over $24 to $25. Rerolling Rails are also easier, and lower prices prevail for Axles and Borings. The following are the prices current per gross ton, f.o.b. cars, Chicago:

Old Iron Rails	$18.00 to $18.50
Old Steel Mills, mixed lengths	14.50 to 15.00
Old Steel Rails, long lengths	17.50 to 18.50
Heavy Relaying Rails	24.00 to 25.00
Old Car Wheels	21.00 to 21.50
Heavy Melting Steel Scrap	14.00 to 14.50
Mixed Steel	12.50 to 13.00

The following quotations are per net ton:

Iron Fish Plates	$14.50 to $15.00
Iron Car Axles	19.00 to 19.50
Steel Car Axles	16.50 to 17.00
No. 1 Railroad Wrought	14.25 to 14.75
No. 2 Railroad Wrought	13.50 to 13.75
Shafting	16.00 to 16.50
No. 1 Dealers' Forge	12.50 to 13.00
No. 1 Busheling and Wrought Pipe	11.25 to 11.75
Iron Axle Turnings	11.50 to 11.75
Soft Steel Axle Turnings	11.25 to 11.50
Machine Shop Turnings	11.00 to 11.50
Cast Borings	5.75 to 6.00
Mixed Borings, &c	5.75 to 6.25
No. 1 Boilers, cut	12.50 to 13.00
Heavy Cast Scrap	13.50 to 14.00
Stove Plate and Light Cast Scrap	10.50 to 11.50
Railroad Malleable	14.00 to 14.50
Agricultural Malleable	13.25 to 13.75

Metals.—Copper has continued quiet, and the tone of the market is somewhat easier for Casting Copper, which is held at 13¼c. to 13⅝c., while Lake is barely steady at 13½c. to 13⅝c. in carload lots. Spelter has been in more amply supply and the demand less active, with offerings at 5.65c. for September and 5.60c. for October, but spot is held at 5.70c. Lead has continued firm with a good demand and light offerings, smelters being sold ahead for from 30 to 60 days. Prices are nominally unchanged at 4.05c. in 50-ton lots and 4.07½c. in carload lots. Old Metals have been more active and firmer in tone. Heavy Cut Copper is selling at 12⅛c., Red Brass at 11⅛c., Copper Bottoms at 11c., Lead Pipe at 3.80c. and Zinc at 4.65c., spot.

Coke.—The market has been quiet, there being only a moderate demand from local founders and less buying by furnaces. Prices are well sustained both for early shipments and for contracts, the prominent feature in the market continuing to be the growing shortage of cars for early shipment. Connellsville, Pocahontas and New River 72-hour Foundry Coke is selling at $2.75 to $3.25, and Furnace Coke at $1.75 to $2.25, at the ovens; freight, Chicago, $2.65. Among the sales were 300 cars at $1.95, at the ovens, for delivery during the last half of the year.

Philadelphia.

FORREST BUILDING, September 15, 1903.

The Iron and Steel situation cannot be said to have improved during the past week, and, if it has not deteriorated, it is as much as can be said in its favor. There is a considerable volume of business under way, but in every department the selling end appears to have the preponderance, which is confirmed by the continued weakness in prices. Statements of this kind are not popular, but they are true, and there is nothing to be gained by ignoring facts. In regard to the future, there are differences of opinion, but with the present surroundings one man's opinon is liable to be as good as another's, as at best there is no basis for anything more than a guess. There are very few, however, who look for a betterment either in prices or in demand. The consumption of Pig Iron, as indicated by recent statistics, is probably at the rate of over 19,000,000 tons per annum, which is still a large total, although not as large as during the earlier months of the year; and, moreover, it is on the declining scale. The question of prices is a more difficult subject to grapple with, and admits of any amount of argument, but the most direct method is to regard it as a condition rather than as a theory. From that point of view it looks as though bottom has not been reached yet. It may be very near bottom, but so long as in all departments there are more sellers than buyers and more material than is required, it is not to be expected that bottom prices have been reached. Prices have probably reached a point at which business is unremunerative, but that will not help matters as long as the market is oversupplied with material. If low prices enforce curtailment then there would be grounds for expecting a check to the decline, and ultimately to a recovery in prices, but that point has not been reached yet. It was supposed that some kind of an adjustment would have been made by this time, but Iron manufacturers admit their inability thus far to get costs down to a point that would show a margin of profit at prices which are now recognized as all that the market will afford. A continuance of present conditions, therefore, would not be of the least advantage as continued overproduction, even at low prices, only makes bad worse. For the present, however, there is not much basis for expecting a better market, but it is hoped that nothing will occur to cause further deterioration.

Pig Iron.—More Iron is being taken than at any time since early spring, but it is simply to replace contracts which were made several months ago, and which are now completed. At first sight this may look like improvement, but the furnace that replaces orders for $20 Iron, with others at $16, will not regard it in that light. Nevertheless, the facts are as stated, and no great amount of Iron is taken even at the reduced prices. Buyers take enough to cover early requirements, and once in a while a sale may be made with deliveries to extend over the remainder of the year, but in most cases 30 to 60 days is the limit. So far as can be seen at the present time these conditions will continue indefinitely. There is nothing to indicate a betterment in the general situation, and until there is, large operations are out of the question. Lower prices would be no advantage, so that is not a question of prices but of demand. The amount of Iron going into consumption is still very large, but production is larger, and so long as there is disproportion, be the tonnage large or small, prices will be governed accordingly. The discouraging feature at the present time is that there is nothing in prospect likely to increase consumption, and nothing that is likely to decrease production but lower prices, and as either of these alternatives must be met, it is clear that the Pig Iron situation is beset with unusual difficulties. Ultimately it will work out its own salvation, but it will take a good deal of time to do it, and will probably involve disappointment and losses before the final solution of the problem is reached. Prices of Pig Iron at this time are difficult to quote. Small lots of special brands of No. 2 X Foundry bring about $17, while large lots are quoted all the way from $16 to $16.50, and in some cases $16 has been shaded quite sharply. All depends on circumstances, however; some are disposed to keep their trade at almost any price, while others are more disposed to look at their cost sheets than at the going prices. A fair average for deliveries in buyers' yards, Philadelphia or nearby points, would be about as follows:

No. 1 X Foundry	$17.50 to $18.00
No. 2 X Foundry	16.00 to 17.00
No. 2 Plain Foundry	15.00 to 15.50
Standard Gray Forge	15.00 to 15.50
Ordinary	14.50 to 14.75
Basic	15.00 to 15.50
Low Phosphorus	21.50 to 22.00

Steel.—The market is very unsettled, owing in some measure to the low prices quoted for foreign material. It is said that a sale of a considerable tonnage has been made at less than $26, ex-ship, at a New England port, and to meet this class of competition extremely low prices have been quoted for American Steel. Ordinarily, however, $28 to $28.50, delivered, is asked, and sales in small lots are being made at the figures named, but the market is unsettled with a tendency toward lower figures.

Plates.—The demand has been somewhat better during the past few days, but with very little business on the books, there is considerable anxiety to secure additional orders. These are not likely to be in large volume, although the day-to-day demand furnishes a moderate amount of activity, but uncertainty in regard to the future is the disquieting feature. Prices are steady and unchanged, as follows, for city and nearby deliveries, base prices up to 100 inches: Tank Steel, both Sheared and Universal, 1.75c. to 1.80c., in large lots; Flange, 1.85c. to 1.90c.; Commercial Fire Box, 1.95c. to 2c.; Locomotive Fire Box, 2.25c. to 2.30c.; small lots, 10c. to 15c. per 100 extra; 100 to 110 inches, 0.05c. extra; 110 to 115 inches, 0.10c. extra; 115 to 120 inches, 0.15c. extra; 120 to 125 inches, 0.25c. extra; 125 to 130 inches, 0.50c. extra; over 130 inches wide, 1c. extra; Plates under ¼ inch on edge, 0.10c. extra; under 3-16 inch on edge to No. 8, 0.15c. extra; No. 9, B. W. G., 0.25c. extra; all Sketch Plates, 0.1c. extra; all Circle Plates, 0.2c. extra.

Structural Material.—Business in this department is very dull, and it seems likely to continue so for an indefinite period. Projects, which would have given a great deal of employment during the winter months, are now hung up or

canceled, so that there is little or no chance for activity in the near future. Prices are unchanged, however, at 1.73½c. to 1.85c. for Beams, Channels or Angles, according to specifications.

Bars.—There is no improvement in the market for Bars. The low price of Refined Iron gives it a preference over Steel, and to this extent the market is better, but prices are very unsatisfactory. Some mills offer Iron at 1.50c., delivered, but for good Refined Iron in carload lots 1.60c. is a fair average quotation. Steel Bars are dull at unchanged prices—1.73½c. to 1.75c., delivered.

Sheets.—There is a good deal of inquiry, but business comes in very slowly. Prices are weak and on good sized lots buyers can do better than they could have done a week ago, owing to the lower prices for raw material.

Old Material.—The market is dull and prices are again somewhat lower, bids and offers for deliveries in buyers' yards being about as follows:

Old Steel Rails	$16.00 to $17.00
Heavy Steel Scrap	16.00 to 16.50
Low Phosphorus Scrap	24.00 to 25.00
Old Steel Axles	18.00 to 19.00
Old Iron Rails	19.00 to 20.00
Old Iron Axles	20.00 to 21.00
Old Car Wheels	18.00 to 19.00
Choice Scrap, R. R. No. 1 Wrought	17.00 to 17.50
Country Scrap	15.00 to 16.00
Machinery Scrap	14.50 to 15.00
No. 2 Light Scrap	15.00 to 16.00
No. 2 Light (Ordinary)	11.00 to 12.00
Wrought Turnings	10.50 to 11.00
Wrought Turnings, Choice Heavy	11.50 to 12.00
Cast Borings	7.25 to 7.75
Stove Plate	11.50 to 12.00

St. Louis.

CHEMICAL BUILDING, September 16, 1903.—(*By Telegraph.*)

Pig Iron.—There is no urgency to get Iron, and the character of the transactions the past week are the same as of late—namely, shall requirements for early delivery. While a short time ago there were some encouraging signs for a resumption of at least a fair buying power, affairs are such now that the trade seem inclined to expect a dull market for some weeks ahead. Nominally, the price for No. 2 Foundry is on a Birmingham basis of $11.75, put in many instances this price has been shaded. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry	$15.75 to $16.00
Southern, No. 2 Foundry	15.25 to 15.50
Southern, No. 3 Foundry	14.75 to 15.00
Southern, No. 4 Foundry	14.25 to 14.50
No. 1 Soft	15.75 to 16.00
No. 2 Soft	15.25 to 15.50
Gray Forge	14.25 to 14.50
Southern Car Wheel	26.50 to 26.75
Malleable Bessemer	18.50 to 19.00
Ohio Silvery, 8 per cent. Silicon	22.50 to 22.75
Ohio Strong Softeners, No. 1	18.75 to 19.00
Ohio Strong Softeners, No. 2	18.25 to 18.50

Bars.—The demand on the jobbers for Iron and Steel Bars has been fairly well sustained the past week. We hear quotation of 2.15c. to 2.25c. for both Iron and Steel.

Rails and Track Supplies.—The market for Rails and Track Supplies is very steady, and the price conditions are unchanged. We quote as follows: Splice Bars, 2.05c. to 2.15c.; Bolts, with Hexagon Nuts, 3.05c. to 3.15c.; with Square Nuts, 2.90c. to 3c.; Spikes, 2.15c. to 2.25c.

Angles and Channels.—The volume of demand for Angles and Channels continues good, and sales are being executed by the jobbers on a basis of 2.25c. to 2.40c. in lots from store.

Pig Lead.—Owing to an increased demand and an inadequate supply, prices have advanced considerably. Nominally, the quotation for Missouri brands at this time is 4.45c.

Spelter.—The volume of demand is considerable, and the supply is said to be limited. Prices are very firm, with quotation ruling at 5.65c. to 5.70c., according to delivery.

Cincinnati.

FIFTH AND MAIN STS., September 16, 1903.—(*By Telegraph.*)

The trend of the Pig Iron market has not been seriously interfered with by the transactions of the past week. Iron is still selling in moderate quantities, and the feature of the trade is the promptness with which buyers desire orders delivered. Quite a number of good sized inquiries are floating around for Foundry Iron, and these are being picked up where sales are made by those furnaces which are willing to sell on the general basis of $11.50 for No. 2 Foundry, Birmingham. In some instances, where 25c. to 50c. higher is obtained (and the 50c. higher is obtained only in extreme cases), the trades are smaller and are made by reason of buyers desiring a particular class of Iron or the personal influence of the seller in the market. Several lots of Gray Forge are reported as sold; these, almost without exception, on the basis of $10, Birmingham. Northern Irons are lower than the Southern article in most of the interior points in this territory, and rumor has it that some of these sales have been made on a lower basis even than that which we quote herewith. Some sellers are emphatic in the declaration that Northern Iron cannot be bought on a lower basis than $14.75, Hanging Rock district, but this claim is offset by other sellers who insist that they have sold it on the basis of $14.50. Quite a number of sales are reported at different points in Indiana and Ohio, and in many of these trades the Northern Iron carried the day by reason of the lowness of the prices offered. The situation is unchanged, and it looks as though the present hand to mouth system of buying was to continue for a while longer. Neither buyers nor sellers are anxious to extend their contracts far into the future on present basis. Freight rates from the Hanging Rock district, $1.15, and from Birmingham to Ohio River points, $3.25. We quote, f.o.b. Cincinnati, for delivery throughout the year, as follows:

Southern Coke, No. 1	$15.25 to $15.75
Southern Coke, No. 2	14.75 to 15.25
Southern Coke, No. 3	14.25 to 14.75
Southern Coke, No 4	13.75 to 14.25
Southern Coke, No. 1 Soft	15.25 to 15.75
Southern Coke, No. 2 Soft	14.75 to 15.25
Southern Coke, Gray Forge	13.25 to 14.25
Southern Coke, Mottled	13.25 to 14.25
Ohio Silvery, No. 1	20.15 to 21.15
Lake Superior Coke, No. 1	16.15 to 16.65
Lake Superior Coke, No. 2	15.65 to 16.15
Lake Superior Coke, No. 3	15.15 to 15.65
Car Wheel and Malleable Irons.	
Standard Southern Car Wheel	$25.75 to $26.25
Lake Superior Car Wheel and Malleable	23.00 to 23.50

Birmingham.

BIRMINGHAM, ALA., September 14, 1903.

Reports concerning the Iron market are conflicting. At prevailing prices there is no disposition to volunteer information on the part of those charged with cutting values, and their policy is to say as little as they can about it and neither affirm nor deny it. There have been some sales made of "off" grades at reduced values, and the price has been given wide publicity without particularizing the quality. It is probable that these sales are largely responsible for the reports in circulation. The association prices are fairly well maintained at the basis of $12 for No. 2 Foundry, and a leaning toward $11.75 when circumstances influence. The size of the order is a large factor in governing price, and the sellers will go as far as they can to secure one of respectable proportions. There was a fair business done during the week, one lot of 5000 tons being taken by one firm, who will distribute it in turn in smaller lots. There is some gossip about a guaranteed freight rate lower than published tariff; but if it be true the railroads are not in it, and to the seller it would be equivalent to cutting prices, for he would pay the difference out of his own pocket. All the sellers report a better week than the preceding one, with business yet limited as to size of orders and restricted as to delivery. As one seller voiced it, "We are getting no business for delivery beyond October."

There is a general feeling that freight rates will be lowered in the near future, and as long as that feeling exists there will be hesitation as to buying. It is known here that large influential interests are energetically at work on this line with the higher railroad officials, their aim being the restoration of the rate prevalent previous to the last advance; and it looks as if the roads, to secure their tonnage, would have to yield the point. It is a matter of vital importance to both parties in interest.

We are not moving our Iron as fast as it ought to go, and the situation will not change until the freight conditions are settled and buyers can feel some assurance concerning their stability. If the relief prayed for is extended it will be during this month. The next week or ten days will probably decide it.

The move in favor of Greater Birmingham has culminated in a bill which, when passed by the Legislature, will submit the question to the qualified voters of the district affected. Its adoption will be a long stride in our progress. On every hand are evidences of the expenditure of large sums of money in improvements. Our banks show increased deposits, the report of the Car Service Association shows a gratifying increase in cars handled for August, while general business has, in extent, surpassed all expectations. When the railroads come to the relief of the Iron interests (as they surely will) we will have cause for self gratulation.

The Southern Car & Foundry Company are at work again, and will probably be continuously so from now on.

There is something being done in the way of Ore mining in new spots, with great expectations surrounding each new venture. The Pinckard mines, below Bessemer, have taken contracts for Ore, their average of Metallic Iron running materially ahead of the general output. The Coal yield is now well in hand, and it is being shipped as fast as it comes to the surface. Competition makes profits small, but it leads also to those small economies which in well managed mines are considered a satisfying profit. Labor yet continues in demand, and the supply is very much less than is the de

mand. The same remark applies to all the varied (skilled and unskilled) fields of labor.

Pittsburgh.

(By Mail.)

Reports in the daily press that the United States Steel Corporation are figuring on the purchase of 100,000 tons of Bessemer Iron for shipment in last quarter are a little premature, to say the least. The corporation may need some Iron for delivery last three months of the year, but no actual negotiations are yet on and may not be for some little time yet. Local interests of the United States Steel Corporation are not taking in Iron as promptly as they did some time ago, and in fact have shut off shipments of metal to a number of their Steel works which are idle. Interest centers on the meeting of the Steel companies composing the Billet pool, to be held in New York City on Thursday of this week. There has been a good deal of talk of a probable reduction in the price of Billets, Sheet and Tin Bars, to meet the lower prices ruling for Bessemer Iron. It is not likely there will be any change in the price of Steel, as it is the belief of the manufacturers that to make a reduction in price would not help the market a particle, but, on the contrary, would only add to the uneasiness and hesitation in placing contracts which now exist. Sales of Steel by the Billet pool are said to be increasing, a fair tonnage of Rod Billets having been sold recently and at full pool prices. The Steel market has been disturbed to some extent recently by the actions of a local concern which is offering Steel below pool prices. A part of this Steel is said to be Open Hearth, and is coming from Birmingham, Ala., and the balance of it is Bessemer Steel, due the concern on an old conversion contract made before the Billet pool was formed. The Bessemer Iron market seems to have settled down to about $16.50 at Valley furnace, or $17.35, Pittsburgh; but we understand the furnaces composing the Bessemer Furnace Association are holding their Iron at about $17 at furnace. There is a better inquiry for Steel and the market is quite firm at the regular prices, aside from the outside Steel which is being offered, referred to above. There is some increase in inquiry for Finished Iron and Steel, some large contracts for Structural Material being on the market, and demand for the larger sizes of Pipe continues very heavy. There seems to be a more hopeful feeling all around, and it is believed that before September closes the whole Iron market will be in much better shape.

Muck Bar.—There is some inquiry, and best grades of domestic Muck Bar are held at $29 for good sized lots and $29.50 to $30 for small lots. A sale of 200 tons is reported at $29, Pittsburgh.

Structural Material.—Interest centers on the Blackwell's Island Bridge, which will require about 50,000 tons of material, nearly 10,000 tons of which are heavy Eye Bars This contract, if placed, is expected to be secured by the leading interest. Bids are being opened to-day (Tuesday) for the Steubenville Bridge, 4500 tons, and a railroad station at Atlanta, Ga., about 2500 tons. The train sheds for the latter job will not be let for some little time yet. There is a good run of small orders and the Structural trade is holding up remarkably well, considering the lateness of the season. The settlement of the labor troubles in several of the large cities is having a very good effect. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Steel Rails.—No large contracts have recently been placed, and the railroads are later this year than usual in placing orders. We quote at $28, at mill, for Standard Sections, and Light Rails $30 to $32.

Iron and Steel Bars.—A fair tonnage is being placed in Bars, but most of the leading mills are short of work and could take care of a much larger tonnage if it was being placed. The low prices ruling for Iron Bars have caused some consumers to use these in place of Steel Bars, as prices on the latter are being very firmly held and will not likely be reduced to meet the new competition. We understand Iron Bars have been sold as low as 1.40c., at Eastern mill, but the price f.o.b. Pittsburgh is about 1.60c. We quote Steel Bars at 1.60c., Pittsburgh, in carloads and larger lots. For quantities less than 2000 lbs., but not less than 1000 lbs., $2 a ton additional is charged, and less than 1000 lbs., $6 additional.

Spelter.—The Spelter market is extremely firm, and the outlook is that prices may be higher. We note a sale of 100 tons of Prime Western Spelter at a price equal to 5.70c., Pittsburgh delivery. For spot delivery about 5.73½c. is quoted.

Ferromanganese.—The combination price on English and domestic Ferro is $49, Pittsburgh, for 50-ton lots and over, but we understand sales have been made recently at $48, delivered.

Sheets.—There is a moderate demand for Black and Galvanized Sheets, but consumers hesitate to place contracts in the belief that present prices may not hold. The result is that buying is mostly in carload lots for actual needs, and very few contracts are being placed. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.55c. to 2.60c., and No. 28 at 2.65c. to 2.70c., in carloads and larger lots. On a nice specification and for a large contract the lower prices might be slightly shaded by a few mills. Galvanized Sheets are held at 75, 10 and 5 off, at mill, for carloads and larger lots. Jobbers charge the usual advance for small lots from store.

Rods.—There is some inquiry for Bessemer Rods from the Wire trade, and we quote them at $34.50 to $35, maker's mill. Open Hearth Rods are held at $35.50 to $36, and Chain Rods, made of special stock, at $37, Pittsburgh.

Plates.—The situation in Plates is not very satisfactory, consumers holding off placing contracts, and the mills report considerable difficulty in getting specifications on contracts placed some time since. The leading Steel Car interests are not receiving many contracts for Cars, and are buying only a limited tonnage of Plates. The mills insist that there will be no reduction in price of Plates, and that consumers are perfectly safe in making contracts. We quote: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches wide, 5c. extra per 100 lbs. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Hoops and Bands.—The three leading interests have booked a fair amount of tonnage in Hoops and Bands, and the Cotton Tie season will open very soon. Demand for the latter this year is expected to be heavier than ever before. We quote: Cotton Ties, 87c. in 10,000-bundle lots or over; 92c. for carloads; Steel Hoops, 1.90c. in 250-ton lots and 2c. for carloads; Bessemer Bands, 1.60c. to 1.70c. for Open Hearth. Extras as per Steel Card.

Merchant Steel.—Some good sized contracts have been placed by agricultural implement makers, including a very large tonnage of Soft Center Plow Steel, taken by the leading interest. Low prices were made on this tonnage in competition with outside mills. There is a fair demand for Tool Steel, but prices are being shaded more or less, especially to consumers who will contract for a long time ahead. We quote as follows: Open Hearth Spring, 2.30c. to 2.40c., base; Toe Calk, 2.25c., base, half extras; Tire Steel, 1.80c. to 2c. for usual sizes; Plow Slabs, Bessemer, 2.25c.; Open Hearth, 2.50c.; Tool Steel, 6½c., base, and upward; Shafting, 42 per cent. off in less than carloads and 47 per cent. in carloads, delivered in base territory. We note, however, that on most of the large tonnage recently booked the above prices were more or less shaded.

Tin Plate.—The leading mills have booked a fair amount of tonnage. Contracts from canneries are later this year than usual, but are expected to be placed in a short time. We quote at $3.80, Pittsburgh, for 100-lb. Coke Plates.

Skelp.—Demand continues very dull and prices are inclined to weakness. We quote Grooved Iron and Steel Skelp at 1.80c. and Sheared at 1.85c., f.o.b. Pittsburgh. On a large contract for desirable sizes these prices might be slightly shaded.

Pipes and Tubes.—Demand for the smaller sizes of Merchant Pipe has fallen off to some extent, and some little unevenness in prices is reported. On 6-inch and larger the Pipe mills are filled up practically for balance of the year. Consumers' discounts in carloads are as follows:

	Steel.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inches	75	65	72	62
7 to 12 inches	69	59	66	56

Merchant Boiler Tubes.

	Steel.	Iron.
1 to 1½ inches	42½	39
1¾ to 2½ inches	55½	38
2¾ to 5 inches	61	48
6 to 13 inches	55½	38

The outside mills rolling Iron Pipe are naming lower discounts than are given above.

Iron and Steel Scrap.—The Scrap market continues very dull, and hardly enough material being sold to establish a market. Heavy Melting Stock is being offered at $16.50 to $17 in gross tons, and sales of 8000 to 10,000 tons have been made, mostly at the lower figure. Cast Iron Borings have gone off in price and we note a sale of 250 tons at $7, gross tons. No. 1 Wrought Scrap is $14 to $14.50 in net tons; Cast Scrap, $15.50, gross tons; Wrought Iron Turnings, $11, net tons; Busheling Scrap, No. 1 stock, is $13.50 to $14, net tons; Iron Axles, $25, gross tons, and Steel Axles

about $23, gross tons. We may note that some forced sales of Scrap—that is, on material already loaded on cars and which had to be moved—have been made at lower prices.

Coke.—Output of Coke in the Upper and Lower Connellsville regions last week was 303,815 tons, and total shipments were 12,789 cars, an increase over the previous week. Shipments East showed an increase, but to Western points they fell off, a number of blast furnaces in the Pittsburgh and Valley districts being idle. Strictly Connellsville Furnace Coke is held at $2.25 to $2.50 a ton, and 72-hour Foundry from $2.75 to $3 a ton. Main Line Coke made outside of the Connellsville region is being sold at lower prices, especially for Eastern shipment.

Cleveland.

CLEVELAND, OHIO, September 15, 1903.

Iron Ore.—The market is still dull, with nothing of importance stirring. The rates of carriage remain unchanged at 80c. from Duluth to Ohio ports, 72½c. from Marquette and 60c. from Escanaba. The prices have not changed, being nominal at $4.50 for Bessemer Old Range and $4 for Bessemer Mesaba. The stock piles have been increasing along the lakes and have now about as much Ore as they will hold, the movement now being direct from the lake boats to the furnace stock piles.

Pig Iron.—In Pig Iron the situation is weak as regards trades, but has gained some strength from collateral developments. The refusal of the railroads to reduce the rates from the South has given Northern producers more courage and has strengthened their stand on Foundry prices, which, however, are weakened by reason of the cutting of Southern producers outside of the association. In the North the future demand is increasing, there being evidences of greater activity among manufacturing concerns which use Foundry Pig Iron. The production in the Valleys may be said to be heavy and the shipments away from the stacks are large, very light stocks being collected at this time. These stacks are, nevertheless, feeling the competition of the new capacity which has been blown in since the middle of the year. The sales have been comparativly light, most of them being for spot delivery, and on most of them tracers being asked. In making prices the furnaces are governed altogether by local conditions. Buffalo, Cleveland, Youngstown, Toledo and Detroit are all quoting different prices, and the market, of course, varies a great deal. The basis which it is attempted to maintain is $16, in the Valleys, but this is being shaded by certain furnaces. There has been some talk of shutting down some furnaces at the end of this month. However, the new demand that is promising to spring up soon has a tendency to offset that situation. Southern association furnaces are trying to sell Iron in this territory at $12, Birmingham, with indifferent success, against the independent stacks which have been selling at $11, Birmingham, and getting a great deal of business. There is a good call for Malleable Iron still and it is holding strong at $16.50, in the Valleys, with some business showing up in the way of long time contracts. Gray Forge is fairly active at $16, the market being weak at that price, however. Basic and Bessemer producers are realizing the futility of trying to hold prices up to the level recently quoted, and have now offered material during the fourth quarter at about $16, in the Valleys. This applies especially on Basic, in which line there are some inquiries. Bessemer is still dead and practically off the market. No inquiries of importance have been received, and the price is nominally about $16, in the Valleys, for fourth-quarter material. The Coke supply is abundant, and any fear of a shortage is offset by the possibility of a shutting down of some of the stacks.

Finished Iron and Steel.—The market promises ever so much better of late than it has been for some weeks. In three prominent lines inquiries have come in for long time contracts, some of them to run until July 1, 1904. This has given a decidedly better tone to the market, which has been augmented by the fact that some of the consumers are buying heavily for spot delivery of some staples. The primary activity seems to have been in Structural, for which one good order was placed last week, with others pending. It is known that some contracts will, in all probability, be closed before this week is out for a good tonnage, to be delivered during the next year. Specifications on old contracts are also beginning to come in more heavily, and several orders ranging about 500 tons have been placed during the week, to be delivered at once. Some of the contracts which have been pending are being closed, and some jobs which were unfinished are being completed. The price holds at 1.60c., Pittsburgh. In Bars the situation is stronger. There are well defined but unconfirmed rumors of a pool in process of formation among the leading producers to establish the price of Bar Iron at 1.50c., from which there shall be no deviation. Several contracts are pending which may be closed this week, and it is hardly believed that the consumer will be insured against a decline in the price. The small mills, which have not been able to make any deliveries of importance, have been wildcatting in prices and have lowered the market generally. The larger mills have set about to ignore and counteract this influence. The smaller mills have been selling Iron Bars at 1.40c. at the mills for small lots. Steel Bars are stronger and the market firm. Some good buying has been indulged in the past week, and other sales of importance are pending and will be closed within a day or so. Contracts running through a year are now being figured on by some of the big concerns, and it is hoped to close some of them this week. The prices have held firm at 1.60c., Pittsburgh, for Bessemer, and 1.70c., Pittsburgh, for Open Hearth. It cannot be learned that the consumers have been guaranteed against any decline in prices. Plates have also been stronger. Several orders for 500 to 800 tons have been closed and others are pending. Some of the big sales made at premium prices earlier in the year and on which deliveries were not completed have been waived, and new orders have been placed in their stead at association prices. Some of the old contracts have been revived and specifications against them have been made. In addition some new contracts running through a year are appearing in the form of inquiries and the market is stronger. The price holds generally at 1.60c., Pittsburgh. The Sheet trade is seemingly unchanged. Some of the association mills, in fact a large percentage of them, are closed. The smaller mills, which have been built recently, have been cutting the prices, and retaliation on the part of the larger mills has been talked of. Meanwhile on such sales as are made the old price holds nominally at 3.05c. for No. 27 Black Sheets, out of stock; 2.20c. for No. 27 Blue Annealed, in car lots, at the mills; 2.75c. for No. 27, One Pass Cold Rolled, in car lots, at the mills, and 4c. for No. 27 Galvanized Sheets, out of stock. These prices, however, are being shaded. Billets and Rails for the time being are inactive.

Old Material.—The market is dead, with little or nothing being done. The material is offered very freely by the collectors, and the middlemen are cutting prices to get business, having slashed some of the staples, Busheling Scrap among them, to the last notch. The sales have been light and contracts are not forthcoming. The prices revised are as follows, all gross tons: Heavy Melting Steel, $16; Old Steel Rails, $17; Old Iron Rails, $21; Old Car Wheels, $19; Railroad Malleable, $16; Cast Borings, $8. All net tons: No. 1 Railroad Wrought, $15; No. 1 Busheling, $13.50; Wrought Turnings, $11; Iron Car Axles, $22.50; No. 1 Cast Scrap, $14.50; Stove Plate, $11.

PERSONAL.

Henry G. Hay, president of the Stock Growers' Bank, Cheyenne, Wyo., has tendered his resignation to the directors, and his resignation as State Treasurer is expected to follow. Mr. Hay will become assistant treasurer of the United States Steel Corporation.

G. W. Chance, manager of the Trans-St. Mary's Traction Company, Sault Ste. Marie, Mich., has resigned from that company to open an office as consulting engineer in the Drexel Building in Philadelphia. His long experience in electric railway, light and power plant construction and operation, as well as in steam railway engineering, makes him particularly well fitted for general consulting engineering practice.

W. H. Ryer on August 31 severad his connection with the Crucible Steel Company of America as manager of the Denver district, by resignation in favor of his nephew, Milton C. Ryer, who immediately assumed charge. W. H. Ryer has had nearly 17 years' service in the steel business, 14 of which were with the Crescent Steel Company, now part of the Crucible Steel Company of America.

G. B. Levan and G. G. Brown, who have been in charge of the Atlantic Furnace, at New Castle, Pa., for some time, have been placed in charge of the Republic Iron & Steel Company's furnaces, at Birmingham, Ala.

W. L. Simonton, general manager of the Republic Iron & Steel Company, spent a part of last week in Youngstown, Ohio, inspecting the company's plants at that place. the Brown-Bonnell and Mahoning works, at Youngstown, are in operation, but the Andrews plant, at Haselton, is idle, and will not be put in operation until conditions in the iron trade warrant.

Edgar L. Newhouse and Edward Brush have been elected to the Executive Committee of the American Smelting & Refining Company.

The Chair of Physics and Electrical Engineering at the Thomas S. Clarkson Memorial School of Technology, Potsdam, N. Y., has been filled by the appointment of Byron Briggs Brackett.

New York.

NEW YORK, September 16, 1903.

Pig Iron.—The market is fairly active, consumers taking small lots quite freely, and occasionally an order for 1000 tons or more being placed for deliveries running through the year. Southern competition is a little sharper, a special effort being made to secure Eastern business through the plan tried once before of a differential on the trade in this section. It is not believed that much success has followed this movement, as most of the buyers now in the market desire more prompt delivery than Southern producers can assure. We quote, at tidewater: No. 2 X Foundry, $15.75 to $16.75; No. 2 Plain Foundry, $15.25 to $16.25; Gray Forge, $14.75 to $15.75; Basic, $15 to $16. Tennessee and Alabama brands: $16.25 to $16.50 for No. 1, $15.25 to $16.25 for No. 2, $14.75 to $15.75 for No. 3.

Cast Iron Pipe.—Although large contracts are very scarce, the number of small lots wanted is so considerable that business continues excellent, and from appearances is likely to be so until the weather prevents Pipe laying. Carload lots of 6 to 10 inch are quoted at $32 per gross ton, tidewater, and 12-inch upward at $31.

Finished Iron and Steel.—Business in the Structural line is picking up as compared with last month. Current orders are considerably better. The outlook is also very promising. Within a few days bids will be opened on several heavy contracts, five of which will aggregate over 100,000 tons. Among these are the Blackwell's Island Bridge and the New York Central Terminal improvements in this city, the former taking close to 50,000 tons and the latter 30,000 tons. Many building projects, long held up, will soon be put in hand, now that the building trades labor troubles are about settled. The Plate trade is somewhat better, the volume of daily business running larger, although orders are seldom large. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.25c. Sheared Steel Plates, in carload lots, are 1.78c. to 1.85c. for Tank, 2c. to 2.10c. for Flange, 2.10c. to 2.20c. for Marine and 2.25c. upward for Fire Box. Refined Bars are 1.60c. to 1.80c.; Soft Steel Bars, 1.70c. to 1.80c.

Old Material.—No improvement can be reported. Sales are only made at prices which holders regard as sacrifices, and even at that consumers will buy very sparingly. Quotations are nominal, but approximate figures are as follows, per gross ton, New York and vicinity:

Old Iron Rails	$18.00 to $19.00
Old Steel Rails, long lengths	17.00 to 18.00
Old Steel Rails, short pieces	15.50 to 16.00
Relaying Rails, heavy sections	22.00 to 23.00
Old Car Wheels	16.00 to 17.00
Old Iron Car Axles	20.00 to 21.00
Old Steel Car Axles	18.50 to 19.00
Heavy Melting Scrap	15.50 to 16.00
No. 1 Railroad Wrought Iron	16.00 to 17.00
Iron Track Scrap	15.50 to 16.00
Wrought Pipe	11.00 to 11.50
Ordinary Light Iron	8.00 to 8.50
Cast Borings	6.00 to 7.00
Wrought Turnings	11.00 to 11.50
No. 1 Machinery Cast	13.00 to 14.00
Stove Plate	8.00 to 8.50

Iron and Industrial Stocks.

Weakness in the Steel shares was the feature of last week's developments on the Stock Exchange. On Friday, 11th inst., for the first time, the common stock sold below 20, a sale of 300 shares being reported at 19⅞. A slight recovery followed, carrying the price above 20; but on Monday and Tuesday of this week sales of considerable blocks were made down to 19¾. The price has since been a fraction above 20. The preferred sold down to 69, and recovered fractionally. The reason assigned for the weakness of these stocks is the necessity for liquidation by parties who were also interested in United States Realty, the developments in which are referred to in another part of this issue. Other stocks were sympathetically affected, Tennessee declining to 36⅞ from the high point of 40¾ for the week; Republic to 64¼ from 66½; Sloss-Sheffield common to 31½ from 33½; Dominion to 10½ from 15; Crucible Steel common to 87⅛ from 10¼, and the preferred to 69¼ from 70¾; Colorado to 43¼ from 46; Can preferred to 38¼ from 40½. The new Steel 5's sold down to 75 on Tuesday.

The United States Cast Iron Pipe & Foundry Company have made answer in the Court of Chancery at Trenton, N. J., in the suit of Andrew H. McNeal, a stockholder, who asserted that the company were doing business at a loss and that extravagant reports of their earnings were published with the purpose of keeping the value of the stock up in Wall street. These charges are denied and the declaration made that the works are being operated at a profit. It is asserted that for the year ending May 31, 1900, the net earnings were $946,76; for 1901 they were $210,533 and for 1902 $711,724, and for 1903 to May 31 they amounted to $1,228,724. Besides these earnings more than $650,000 for additional improvements was paid.

The members of the stock conversion syndicate of the United States Steel Corporation have been called upon to pay $5,000,000, which is 25 per cent. of the amount pledged to pay for a similar amount of bonds. The life of the syndicate, which would have expired by limitation on October 1, has been extended to July 1 of next year. No statement is made as to the actual amount of preferred stock retired, but it is said to be satisfactory to those having the matter in charge.

Colorado Fuel & Iron Company.—The report for the year ending June 30, 1903, shows that net earnings from operating departments carried to the credit of the income account were $1,990,982.74, an increase of $189,057.47, as compared with the preceding year. The net earnings of the fuel department show an increase of $344,921.76 and the iron department a decrease of $88,173.74. In the fuel department the production of coal increased 990,241.45 tons and of coke 266,554.85 tons. The total net earnings from all sources amounted to $2,057,342.34, which provided for all fixed charges, sinking funds, preferred stock, dividend paid February 20, 1903, &c., leaving a balance of $203,611.79, which was carried to the credit of profit and loss. The balance to the credit of profit and loss account is $586,112.60, representing accrued and undivided profits at the close of the current business year. During the year $5,000,000 of the new 5 per cent. ten-year debenture bonds were issued. Of these 1000 were converted into common stock, leaving the amount outstanding at the end of the year $14,068,000. The expense and discount of these bonds, amounting to $185,702.45, were charged to equipment, iron department. The interest on the bonds, amounting to $682,570.84, was charged to income. Costs were largely increased by reason of the additional expense caused by operating the steel works, while so much construction was going on. The general offices are to remain in Denver.

Dividends.—New Haven Iron & Steel Company have declared a semiannual dividend of 15 cents per share, payable September 25. This places the stock on an annual dividend basis of 6 per cent., instead of 10 per cent. as heretofore.

The Board of Directors of the Westinghouse Air Brake Company of Pittsburgh have declared a regular quarterly dividend of 2½ per cent. and an extra dividend of 3½ per cent., payable October 10.

Nova Scotia Steel Company have declared the regular quarterly dividend of 2 per cent. on the preferred stock, payable October 15, and an *interim* dividend of 3 per cent. on the common stock, payable October 15.

General Electric Company have declared the regular quarterly dividend of 2 per cent. on the common stock, payable October 15 to stock of record September 16.

Sloss-Sheffield Steel & Iron Company have declared a dividend of 1¾ per cent. on the preferred stock, payable October 1. Books close September 21 and reopen October 2.

The regular quarterly dividend of 1 per cent. on the common stock of the International Steam Pump Company will be paid October 1. Books close September 21 and reopen October 2.

Otis Elevator Company have declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable October 15 to stockholders of record September 30.

Crucible Steel Company of America have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock.

American Smelting & Refining Company have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable October 6. Books close September 23 and reopen October 7.

Independent Sheet Manufacturers' Association.—In the issue of *The Iron Age* of September 3 we noted the fact that the independent sheet manufacturers had formed a permanent organization under the title of Independent Sheet Manufacturers' Association, and that James A. Campbell of the Youngstown Iron Sheet & Tube Company, at Youngstown, Ohio, was temporary president. We can state that James H. Nutt, who is Labor Commissioner of the Republic Iron & Steel Company, with headquarters at Youngstown, Ohio, has been secured as secretary of the new organization. The principal reason for forming the new organization was that the independent sheet mills could treat with the Amalgamated Association on wage questions as a body, instead of individually, as heretofore. It is understood that some concessions will soon be asked from the Amalgamated Association by the independent sheet mills that are now enjoyed by nonunion sheet mills. Mr. Nutt will continue his connection with the Republic Iron & Steel Company.

The New York Machinery Market.

NEW YORK, September 16, 1903.

Expressions of disappointment over the condition of business are more marked and universal than at any time during the present period of quietness. From all quarters of the machinery trade the reports bespeak pronounced dullness. Many inquiries which were taken to mean positive sales have been "pigeon holed" indefinitely. The disposition to defer purchases which has been manifest for months has assumed large proportions, and many machinery merchants who were extremely optimistic as to a resumption of buying interest now express fears that the fall season cannot be looked to for a change in existing conditions. There is one feature of the situation, however, which is extensively remarked upon. It is the fact that trade is free from the panicky state incidental to the cancellation of orders. There are no cancellations to speak of. This is doubtless due to the caution displayed by purchasers some months ago, and the general holding up of orders. Had these orders been placed, many of them would probably be canceled now as a result of the uneasy feeling concerning the near future. This would have created conditions more adverse than those prevailing at present.

All eyes are on the iron market, as prospective purchasers state that they intend waiting until it becomes more settled and the present downward movement of prices halts. Machinery merchants express the opinion that as soon as this occurs a decided improvement in trade will set in.

No orders have been placed during the last week by any of the large companies who have been in the market with important specifications.

We are advised by the Lidgerwood Mfg. Company of 94 Liberty street that they have decided to defer the building of their proposed machine and erecting shops at Newark, N. J., for the present year. The foundry and power house will, however, be constructed at once, and bids for the structures are now being received. The power plant will consist of a building 40 x 225 feet, and the foundry will be 120 x 600 feet. The specifications for the equipment of these buildings have not been issued as yet.

Considerable interest is attached to the statement of President L. F. Loree of the Baltimore & Ohio Railroad Company to the effect that $25,000,000 has been appropriated for the improvement of their line. It is estimated that this sum will only cover the preliminary operations, and that the complete plans, which have not been announced as yet, will necessitate the appropriation of several times this amount.

Reported building operations in Philadelphia by the Western Electric Company of 59 Bethune street, New York City, have occasioned considerable comment and inquiry in the trade. We are officially advised that the company will erect a large warehouse and storage plant on the plat of ground at the southwest corner of Eleventh and York streets. A portion of the plant will also be used for manufacturing purposes. The plans for the buildings have been prepared, but the amount of machinery equipment to be installed has not been determined upon as yet. The cost of the buildings will be about $100,000. When completed the factories at Ninth and Oxford streets and Market street, Philadelphia, will be transferred to the new plant.

It will be recalled that about a year ago negotiations were on foot for the establishing of a plant in England for the production of the Acme screw machines, as produced by the National Acme Company of Cleveland. The original project contemplated the carrying out of the plans on a rather elaborate scale. We are advised that the negotiations have just been concluded in the sale of the English patents covering these machines to the Acme Lathe & Products Company, Limited, who will build a plant at Trafford Park, near Manchester. As the name of the company implies, the machines will be built at the new plant, and the products of the machines will be sold. We understand that there is little likelihood of American machinery being installed in the proposed plant. E. D. Cleghorn is managing director of the company.

Reeves & White of Port Richmond, New York City, Eastern agents for the Trustcott Boat Mfg. Company of St. Joseph, Mich., are organizing a company to be known as the White Craft & Power Company. They intend to erect a large plant for the building complete of high grade pleasure craft and vapor marine motors. In a short time they will be in the market for complete equipments of wood working machinery, tools, power plants and nickel plating outfits.

The Susquehanna Iron Company, who were incorporated last month with a nominal capital stock of $200,000, will operate the Danville Blast Furnaces, at Danville, Pa., in the manufacture of foundry iron and by-products, such as slag, cement, mineral wool, &c., and are in the market for a considerable quantity of mechanical equipment. This includes mining machinery, hoists, air compressors, drills, cars, rails, electric power plant equipment, gasoline engines ranging from 20 to 50 horse-power and other supplies of a like nature. The company, whose headquarters are at Catawassa, Pa., intend equipping four plants at the present, and also a complete cement plant, the equipment for which has not yet been obtained. The buildings will be of steel throughout, and a considerable quantity of furnace repairs and supplies, fire brick stock, barrows, &c., will be purchased. H. R. von Dorster is in charge of the work.

The first official information concerning the contemplated extension to their power house service by the Brooklyn Rapid Transit Company has just been made public in the annual report, issued last Monday. The report states: "To provide for further addition to power system ground was purchased adjoining the present Eastern Division Station at Kent avenue, containing 48,760 square feet, with 281 feet fronting on the river. This is a favorable situation for the next large power house, and plans for the plant are now under way. There was purchased for use as reserve coal storage yard the block adjoining the new central power station and abutting on Gowanus Canal. About two-thirds of the ground, with capacity for 100,000 tons, will be immediately equipped for that purpose. Handling machinery is now being installed."

We are advised that the J. L. Mott Iron Works are advancing the construction of their new buildings at Trenton, N. J., and that they are now placing orders for some of the equipment. They have just awarded contracts to the Green Fuel Economizer Company of 74 Cortlandt street for 600 horse-power of economizers, which will be operated in connection with water tube boilers of the Franklin type purchased from the Washington Company of 39 Cortlandt street. The complete boilers installed will aggregate 900 horse-power.

The date for receiving bids for the extensive power plant equipment to be purchased by the New York Central Railroad Company and used in connection with the electrification of their New York terminal was extended, and the bids were opened yesterday.

The contract for the boiler equipment incidental to the enlargement of the shops of the New York Central Railroad Company at West Albany, N. Y., has just been awarded to the Washington Company of 39-41 Cortlandt street. The order calls for 2100 horse-power of heavy pressure water tube boilers of the Franklin type.

Benjamin Moore & Son, paint manufacturers, whose plant is located on Water street, Brooklyn, are purchasing equipment for an extensive new plant to be erected at Carteret, N. J. They have awarded the contracts for the engines and boilers to Hewes & Phillips of Newark, N. J. The engine will be of 150 horse-power and the boilers 200 horse-power.

The Bosworth-Holding Company, 22 South Water street, Cleveland, Ohio, have assumed the Cleveland agency for the Akron Mfg. Company.

The Nassau Light & Power Company, who are extending their plant at Roslyn, L. I., have just placed orders for the new work. The contract for the buildings was awarded to the American Bridge Company. The Alphons Custodis Chimney Construction Company of 95 Nassau street received an order for a 200 x 10 foot stack. Contracts for the first battery of 1000 horse-power water tube boilers were awarded to Thayer & Co., Limited, of 39-41 Cortlandt street. It is intended to purchase 2000 horse-power additional boilers. The General Electric Company received orders for two 1500-kw. steam turbines, direct connected to electric generators. The condenser plan transformers and other accessories have not been purchased as yet. C. O. Mailloux of 76 William street is consulting and contracting engineer for the company.

The power house for the Pennsylvania Railroad's tunnel to Brooklyn and for the Atlantic avenue division of the Long Island Railroad between the Flatbush avenue station and Jamaica will be started this month. All of the buildings now on the block between Third and Fourth streets and Front street and West avenue, Long Island City, are to be removed at once and the piles driven for the foundation for the structure, which will be 250 x 500 feet. Three generators, to be installed at once, for the Atlantic avenue division will have a capacity of about 16,500 kw.—from 22,000 to 25,000 horse-power—which can be increased with an overload to 30,000 horse-power. Sixty-four ducts will be laid for feed wires of the Atlantic avenue division between Flatbush avenue, Brooklyn, and Jamaica. The entire work of this electrical plant installation of the power houses and of the Pennsylvania-Long Island Railroad tunnel from New Jersey under the North and East rivers and Manhattan Island and Long Island City will be under the direction of Westinghouse, Church, Kerr & Co. The consulting engineers are Charles M. Jacobs, Alfred Noble, William H. Brown of the Pennsylvania Railroad, Gustave Lindenthal, Lieutenant-Colonel Raymond of the United States Engineer Corps and George S. Gibbs. Mr. Gibbs is also a member of the Board of Directors of the Tunnel Railroad Company. The company will also construct a similar power house in Jersey City. We are advised that no contracts have been awarded as yet for equipment.

The Philadelphia & Reading Railway Company have asked for bids for the extension of their car shops at Reading, Pa. The building is to be three stories high.

Rapid Tool Steels.

The era of modern rapid tool steels dates from the Paris Exhibition of 1900, where the Bethlehem Steel Company first demonstrated the remarkable working capacity of their Taylor-White tools. To the tool steel maker the demonstration was less a surprise than a fresh stimulus. Within the same year several firms on both sides of the Atlantic came out with new tool steels, upon which they had been experimenting for some time, and for which performances were claimed excelling those displayed at Paris.

At the present time most manufacturers of tool steel will recommend their own rapid tools, which will, on the whole, fulfil what is promised for them. Yet the application of the new tools has remained limited, in spite of the manifest economy which they effect in many classes of work. The reasons are not difficult to find. A novelty has to fight its way. Not everybody can discard the old in favor of the new as readily as the Bethlehem Steel Company, which were credited to have condemned thousands of dollars' worth of tools of Mushet steel after a year's trial of the new material. In the second place, the ordinary lathes would not accommodate themselves to greatly accelerated rates of working. At the Paris demonstration the maximum speed could not be realized for want of power, and this condition of things repeated itself at the Düsseldorf Exhibition last summer. At some of the other more or less official trials—for instance, those instigated by the Berlin branch of the Verein Deutscher Ingenieure—it was in many cases the lathe which had to be spared, not the tool. And there is, third, the prejudice or justifiable hesitation due to want of knowledge.

Long Duration Tests to Be Made.

That the new tools will work for hours, and even days, is conceded. But it is claimed that we need long duration tests; and it is satisfactory to know that such tests are now being conducted at the Municipal School of Technology of Manchester, England, under the supervision of a committee appointed by the Manchester Society of Engineers. Such tests, properly carried out, should give us some further information concerning the abnormal behavior of the new steels. Why they differ in their behavior from ordinary steels is hardly understood. The ordinary steel tool has to be kept well cooled and well lubricated to secure the best results. In gun barrel boring, where the highest speeds have so far been obtained with the old tools—we disregard the somewhat different milling operation—oil is forced under high pressure through the hollow tool, and similar appliances have been resorted to in other instances. Ordinary steel must not be tempered at temperatures above 1600 or 1650 degrees F. lest the desired combination of hardness and toughness be impaired and the material turn brittle. Nor can it bear continued moderate heating, which would lead to annealing and softening of the steel. It is hence essential never to let the tool get hot, and that condition has limited the rate of working on our lathes.

The Mushet Steels.

The Mushet steels of Messrs. Osborne first helped us on. They could take a rough cut at increased speed without water cooling, and the peculiar properties of these steels appeared to open up new prospects. The Mushet steels were not hardened in the ordinary sense—that is, heated to a high temperature and then quenched in some liquid and annealed. They were simply raised to a red glow and then air cooled; this was styled self hardening. The peculiarity has been ascribed to the presence of manganese. This is the view taken by Fridolin Reiser in a contribution to *Stahl und Eisen*, of January 15, 1903. Mr. Reiser is director of Böhler Brothers & Co. of Vienna and Berlin, whose works are at Kapfenberg, in Styria, and Ratibor, in Silesia, and who were among the first in the field with their Boreas self hardening and other rapid tool steels. Mr. Reiser states that the original Mushet steel had the following composition: Carbon, 2 per cent.; manganese, 2.5; silicon, 1.3; chromium, 0.5; tungsten, 5 per cent. The carbon percentage is high, and the carbon-iron compound would have decomposed on slow cooling from high temperatures if the manganese had not exercised its well-known steadying influence. Attempts were made at the time to improve the self hardening steels by increasing the percentage of tungsten at the expense of manganese; but they failed, it may be because both manganese and carbon lower the melting point of steel, for it was afterwards found profitable to heat the steels of novel compositions considerably higher than had formerly been thought advisable.

Superheated Steels.

The Mushet steel tools did not always prove durable, and chromium was substituted for manganese with good results. But such chromium steels required an entirely different treatment, credit for which is due to Messrs. Taylor and White of the Bethlehem Steel Company. In ordinary steels a temperature of 1650 degrees was considered the safe maximum. The new steels are heated up to 2000 dgrees and even 2280 degrees F., equivalent to 1100 and 1250 degrees C. Such temperatures mean superheating to the steel maker, and we agree with Mr. Reiser that the term "superheated steels" best characterizes the new tools. The Taylor-White steel afterwards undergoes a secret treatment, supposed to be rather complicated. Other steels are rapidly cooled in an air blast, or quenched in molten lead, oil, or hot water. The air-novo steel of Jones & Colver of Sheffield, for instance, is heated to lemon color, and then cooled in an air blast or in hot water. The Böhler rapid steel is air cooled or quenched in oil; the firm have, however, also a secret process, like most other manufacturers, and the degree of superheating varies.

The peculiarity of the new steels is that they work best at temperatures which ruin ordinary steels, and can therefore be run dry. The first Taylor-White tools seemed to be better adapted to hogging off than for taking a finishing cut. Since then, however, the tools have been improved, and finishing cuts are made at twice and three times the speeds formerly possible. Speeds of 120 feet for cast iron and of 150 feet for forged steels have been maintained for hours; the air-novo steel cut a pump plunger—a hard steel casting—at the rate of 80 feet per minute, the cut being ⅝ inch deep and the feed 3-16 inch.

The Berlin Trials.

During the Berlin trials, conducted at the German Niles Tool Works and other works, with tools of the Bergische Stahlindustrie of Remscheid, of Felix Bischoff of Duisburg, of Messrs. Böhler, and of the Poldihütte, of Kladno, in Bohemia, cuts 33 mm. (1.3 inch) in depth, with a feed of 1.5 mm. (1-16 inch), were made on a steel shaft containing 0.24 per cent. of carbon and 1.23 per cent. of manganese, at the rate of 20 m. (65 feet) per minute; and at a speed of 64 m. (210 feet) per minute a cut was taken 10 mm. (0.4 inch in thickness, with a feed of 0.75 mm. In other cases the depth of cut was increased to 1.6 inch. In finishing cuts, the speed could, at these trials, not be pushed beyond 210 feet per minute; but the Bischoff steels have attained a speed of 120 m. (nearly 400 feet) per minute, with a depth of cut of ⅛ inch and a feed of 0.25 mm. (0.01 inch). Very satisfactory results were also obtained on the lathes of de Fries, of Heerdt, near Düsseldorf, during the Düsseldorf Exhibition. The Böhler rapid steel worked on mild steel with a speed of 150 feet, and on very hard steel with a speed of 26 feet per minute.

In these cases the same tools often worked for days, with an occasional sharpening, both at long continued high speeds, and at various speeds on different materials. Clean, smooth cuts were obtained, and this fact appears to disprove an assumption made to explain the remarkable efficiency of these tools. It was supposed that the tool did not really cut, but rather split the piece on which it was working.

The Secret of Their Action.

What, then, is the secret of their action? Mr. Reiser believes that we have to consider three points. The carbon combines with the chromium (and also tungsten) to form carbides of great hardness and stability. If we break off the cutting edge of one of these tools we find it dotted with many bright points, crystals of carbides embedded in the steel, just as diamonds are embedded in the crown of a drill. These crystals are less distinct to

the naked eye when a low superheating has been applied, and when the percentage of alloy in the steel becomes high. The manner of cooling also exerts an influence. Mr. Reiser further assumes that the superheating results in a physical change of the steel, to which he ascribes great importance without expressing his views more fully. There is, thirdly, the influence of the high melting point of the chromium and tungsten alloys, to which we have already alluded. Superheating has little effect on high carbon manganese steels.

These views, which, we need hardly say, are more or less shared by many metallurgists, receive a strong support from J. Spüller, the chemist to the Poldihütte, at the crucible steel works at Kladno, in Bohemia. The *Chemiker Zeitung* of February 25, 1903, publishes a memoir by Mr. Spüller, expounding the conclusions at which he has arrived as the result of long experiments made in conjunction with Messrs. Whilacek and Hatlanek, engineers to the Poldihütte. The memoir, it should be mentioned, was submitted under seal as long ago as January, 1902. Mr. Spüller draws attention to the fact, pointed out by all the manufacturers, that the new steels can be filed and machined to shape. Under use, however, the point becomes harder and harder, while the other portions still yield to the file and drill. Owing to friction, the temperature at the point may rise to 500 and 600 degrees C. (1100 degrees F.). The steels, Mr. Spüller argues, contain the elements iron, chromium, tungsten, and likewise titanium and molybdenum, if present, as carbides. Under ordinary conditions the iron carbide predominates. This carbide is soft. When the steel is superheated to 1000, 1100 or 1250 degrees C., the carbon passes to the chromium and tungsten, forming very hard higher carbides, which are stable at high temperatures, while the iron carbide is reduced to iron or to a lower carbide. This iron and iron carbide form the matrix for the hard chromium carbide.

Those higher carbides, Mr. Spüller continues, are known as exceedingly hard needles, and their presence in steel may be presumed. He found them, moreover, both in the point and in the lower portion of a steel tool; his experimental proof of the existence of a chromium carbide, rich in carbon, may be accepted as satisfactory. Further, ordinary steel yields on treatment with copper-ammonium chloride its full amount of carbon as such. Rapid steels show, under this test, a deficiency of carbon, amounting to from 20 to 40 per cent.; but they also generate hydrocarbon gases. Small crystals of carbides are obtained on filtering the solution through asbestos, and these crystals dissolve in sulphuric acid with the liberation of more hydrocarbons. The total carbon in these experiments was determined by combustion tests. The point of the used tool and its lower portion again behave differently in hot nitric acid. The lower portion dissolves; the hard point is scarcely attacked, and splits off carbide crystals; the colors of the resulting solutions differ. Finally, we know that the carbon can react in manifold ways in steel, in cementing, tempering, &c., and will at higher temperatures sometimes become secreted as graphite. The chromium and tungsten carbides, on the other hand, are regarded as remarkably stable.

The Weak Point in These Arguments.

The arguments appear weak in one respect. If the hard carbides are formed at the high temperature of 1100 degrees C., one does not understand why the point afterwards differs so much from the noncutting portion of the tool. There may be an influence of the continued heating due to the friction which requires further elucidation, and there are also the effects of intense pressure—such as must exist at the point of the tool—to be considered. Mr. Spüller himself promises further details; but although his memoir was completed more than a year ago, as we have remarked, he has not published anything further. It is not only the carbides of chromium and tungsten which are distinguished by great hardness. Some silicides, borides and other alloys, studied by De Chalmot, Hutton, Lebeau, Moissan, Scheid aud others in the electric furnace are also very hard, and they interact like the carbides. Such alloys might play a part in the phenomena observed in the tools we are considering. So far the elements chromium, tungsten, molybdenum and titanium seem, next to manganese, to have received most attention from the tool makers; nickel has not given satisfaction, titanium and vanadium have not been much studied. But we have gone far already in the proportion of the metals alloyed with the steel. The Taylor-White steel contains up to 4 per cent. of chromium and 12 per cent. of tungsten; the Böhler rapid self-hardening steel up to 28 per cent. of alloyed metals, and such steels are already very difficult to machine.

With such great differences in the composition we cannot expect at once to arrive at a solution of the problem which will fit all rapid tool steels. If we acquiesce in Mr. Spüller's chief point, however, the presence of a very hard chromium carbide, we may assume that with the use of the tool the less hard matrix is worn away, leaving the hard particle exposed and producing a jagged cut. Such cuts are frequently obtained, and in those cases a cavity is observed to form behind the point of the tool. The softening of the ordinary steel under heating is emphasized by Mr. Spüller, though he does not dwell on the mechanical abrasion of the mass. Sometimes a burr forms first, apparently of fine steel particles torn off and rewelded into the steel; finally, the base of the burr is undermined and it breaks off. Tools of different compositions, differently treated, may, of course, behave differently. The results so far obtained with rapid tool steels are, at any rate, sufficiently encouraging to make us persevere, and the chemist's aid will certainly be needed to solve the problem of the constitution of the steels, as it is still wanted to elucidate the metallurgy of steel in general. The question is in itself of the highest importance, for the development of the rapid cutting tools promises, or threatens, thoroughly to reform our workshop practice.—*Engineering, London.*

Metal Market.

NEW YORK, September 16, 1903.

Pig Tin.—Manipulators have cornered the spot market and advanced prices considerably within the last three days. They have the situation well under control, and as no further shipments of Tin can arrive here this month they are in a position to make things uncomfortable for consumers in need of the metal just at present. It appears, however, that there is no urgent demand, as throughout the entire upward movement business was practically *nil*. Prior to Monday everything was very quiet and only a small amount of business was passing through. At this writing spot is held at 27.40c. and September 27.30c. October delivery is offered, however, at 26.65c., and the bidding price is 26.40c. That conditions abroad are unfavorable is evidenced by the fact that the present London quotations are the lowest of this year. To-day's cables name £120 10s. for spot and £120 7s. 6d. for futures.

Copper.—No business of any account is in evidence. The market is worse than it was a week ago, and prices are softer than for some time. The Quotation Committee of the New York Metal Exchange have not changed their figures, but they now give them as "nominal." In the open market Lake can be obtained at 13.50c., and plenty of Electrolytic can be had at 13.37½c. Casting can be procured for 13c. The "official" quotations "nominally" name 13.75c. to 13.87½c. for Lake, 13.62½c. to 13.75c. for Electrolytic, and 13.37½c. to 13.50c. for Casting. The London market has declined £1 7s. 6d. for spot and £1 on futures. The decline on Best Selected is even more pronounced, amounting to £1 15s. The London cables to-day were as follows: Spot, £56 10s.; futures, £56 2s. 6d.; Best Selected, £61 10s.

Pig Lead.—The American Smelting & Refining Company yesterday advanced their prices 30c., and are now quoting 4.40c. for 50-ton lots and 4.42½c. for carload lots. These figures are based on spot, New York. St. Louis telegraphs 4.45c. The London market declined to £11 3s. 9d.

Spelter.—The market is strong and unchanged, and spot to August closed to-day at 6c. The London market has advanced, being quoted to-day £21 2s. 6d.

Antimony.—The market is weak and declining. Cookson's is quoted at 7.25c., while Hallett's has declined to 6.25c., and other brands are 5.75c. to 6c.

Nickel—Is quoted at 40c. to 45c. for large quantities, and 50c. to 60c. in small lots.

Quicksilver.—The market continues at $47.50 for flasks of 76½ lbs. London cables £8 10s.

Tin Plate.—The market is quiet. The American Tin Plate Company quote $3.80 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to $3.99, New York. English cables are 11 shillings 7½ pence for Plates in Wales, a decline of 3 pence.

The Boiler Competition in the British Navy.

The satisfactory performance of the much discussed and equally much condemned Belleville boilers during the recent British naval maneuvers has resulted in the recognition of the fact that in furthering their introduction Sir William Allen rendered a large public service. The Belleville boiler is in use on no less than 21 of the large battle ships and cruisers. Not one of these ships was disabled or compelled to drop out of the maneuvers. In view of the fact that the Belleville boiler has been roundly abused by English builders and public opinion had become actively hostile to it, these results are as gratifying as many will consider them surprising.

The remarkable record of the battle ship "Spartiate" is regarded by naval engineers as conclusive. No ship in the fleet has a worse name for misfortunes. She was six years in building, and the opinion was entertained that she would never be of much use. After many vicissitudes she was put in commission on March 17, and on the 26th left England for Hong Kong with a relief crew for the battle ship "Ocean." The run of 9600 miles was made at an average speed of 13 knots, and the total coal consumption, for all purposes, was 3000 tons. For the same trip the cruiser "Amphitrite" consumed 4200 tons, and the "Blenheim," with cylindrical boilers and 2000 tons less displacement than the "Spartiate," averaged only 11½ knots and burned 4000 tons.

Sixteen days were spent at Hong Kong, and the "Spartiate" left for England under orders to make the run home a continuous trial trip of her Belleville boiler plant. The following account of the stages of this run, compiled from the ship's log, is interesting, as touching the efficiency and economy of her boiler equipment: Between Hong Kong and Singapore, which was made in 95 hours, all previous records were broken. Another record was made between Singapore and Colombo. From Colombo to Aidin the average was 13 knots, and from Aidin to the Suez Canal her average was 13½ knots. From Port Said to Malta a trial at one-fifth power was made, showing a fuel consumption of 0.9 pound per indicated horsepower. A four-fifths power trial showed a consumption of 1.7 pound. This covered the run from Gibraltar to Plymouth. Although the ship had already made a continuous run of 1900 miles, with no time for even minor repairs, this run was made in 60 hours, with a coal consumption of 1.7 pounds per indicated horse-power. After a stay of 16 days at Plymouth the "Spartiate" shipped a new crew and left to take part in the maneuvers. She joined Admiral Domville's fleet at Lagos, and was immediately told off for duty in patrolling the harbor of Madeira so as to technically and strategically "bottle up" the fleet of Lord Charles Beresford. The account of her experience, as given in the London *Times*, is extremely interesting:

> During the maneuvers the "Spartiate" steamed for 96 hours at 18 knots, and in the eight days covered by the operations traveled 2900 miles. To-morrow she will reach Portsmouth, having traveled 25,000 miles in a matter of five months, without developing defects in her boilers of any kind, though in the machinery department a leaky condenser gave some trouble. No man-of-war has ever done as much steaming in so short a period. This is the most severe test to which the Belleville boilers have been submitted, and it is subject for congratulation that the "Spartiate" has done so triumphantly, especially in view of the fact that her engine and boiler room hands have been changed three times in the five months.

As might be expected, the advocates of the Belleville type of marine boiler are in high feather just now, and on the record quoted are entitled to whatever satisfaction they are feeling. The performances of the "Spartiate" are really remarkable.

Germany's output of pig iron is rapidly increasing. Statastics just issued by *Stahl und Eisen* are as follows:

	July, Metric tons.	First six months. Metric tons.
1902	705,921	4,719,697
1903	865,343	5,799,875

The increase in the first six months of this year over the corresponding period of 1902 was 1,080,178 tons. The maximum output of Germany was attained in 1900, when 8,520,541 tons were turned out. From present appearances these figures will be greatly exceeded this year.

Labor News.

President Buchanan of the International Association of Bridge and Structural Workers has annulled the charter of the local organization in New York City, which has for some time been dominated by Samuel J. Parks. The reason assigned is violation of the regulations of the union. Mr. Parks has thus unexpectedly been shorn of his power, and the way is now open for a settlement of the troubles in this branch of trade. A new local union is being formed, with reasonable and intelligent men in charge. The foremen on all iron construction work, heretofore members of the Housesmiths' and Bridgemen's Union, have perfected an organization of their own, which will be recognized by Mr. Buchanan. It will have branches in all cities, and its primary object will be to prevent the rise of any other Parks in the unions.

The regular bi-monthly wage settlement in nonunion puddling and bar mills was made at Youngstown, Ohio, last week. It was found that the average price of shipments of iron bars in July and August was lower than for the previous two months, and for this reason wages of puddlers were reduced from $6.25 to $6 per ton, guide mill men were reduced 2 per cent., and the rate of heating and rolling was reduced to 70 cents a ton.

The Weimer Machine Works Company's foundry at Lebanon, Pa., is again in full operation with nonunion molders. Over four months ago their molders made unreasonable demands, which were refused, and the molders, with the exception of four, went on strike. The company claim that they get better work and more per molder than they did when they ran a union shop.

In the United States District Court at Bridgeport, Conn., on September 13, D. E. Loewe & Co. of Danbury, hat manufacturers, instituted suit against the national officers of the American Federation of Labor, the national officers of the United Hatters of America and against 250 members of these organizations, residents of Danbury, who were formerly in the employ of the plaintiffs. The plaintiffs allege that because they refused to employ union labor in their factory, upon demand of the union in 1901, their goods were boycotted both in the United States and Canada, and in 1902 the union men employed by the plaintiffs were called out on strike. Damages of $240,000 are asked for under the Sherman Anti-Trust law.

At a conference held in Pittsburgh last week between officials of the American Sheet Steel Company and the Amalgamated Association the wages of sheet mill workers were adjusted for September and October, and will be on the same basis as for July and August.

The "nonunion union," or Association of American Mechanics, made up of those workmen who oppose the methods of the existing trades union, in preparing for a campaign this winter will endeavor to establish a weekly paper. Local lodges will be formed in the various cities. The headquarters of the association is at Muncie, Ind.

The International Union of Steam Engineers convened in annual session at Wheeling, W. Va., on September 14, with 121 delegates present from all over the United States and Canada. Steps will be taken to organize the stationary engineers of the United States and Canada, to secure an eight-hour day. The convention is expected to last about ten days.

In the presence of experts from several colleges a test for establishing a universal unit of refrigeration began at the York Mfg. Company's plant at York, Pa., on September 15. The test is made under the auspices of the National Ice Machine Mfg. Association, and is expected to revolutionize the making of ice machinery. A $10,000 plant is to be used in making the test.

HARDWARE.

DURING the past five years we have been so very busy with the unceasing and importunate demands of daily business that there has been but little time for reflection or for intelligent observation of those great changes that were being forced into hothouse development by the pressure of good times. It is true enough that we have not yet, to all seeming, arrived at the conclusion of that marvelous prosperity which has been with us since the beginning of 1899, especially as the now assured crops of more than average yield promise good business for several months to come. Yet it is patent enough even to the casual observer that the heyday and flush of good times are past, and that the best we can hope for from now on is a continuance in diminished volume of the surpassing demand of the past five years. The economies of the railroads, the cautious buying of the distributers and the slowly declining prices of Steel and Iron products point only too surely to the fact that the crest of the wave has passed.

One of the noteworthy and apparently permanent evolutions is the enormous concentration in manufacturing the cruder and heavier products, and the diminished proportionate importance of the individual producer in these lines. Political opposition, the passage of innumerable anti-trust laws, and even the mistakes of the aggregations themselves, have not resulted in preventing this most remarkable evolution in the commercial world. It is now plain that the great concentrations are to be reckoned with as permanent factors, but the effect of hard times, whether it be to crystallize or disintegrate them, is a matter on which the commercial world is awaiting developments. There has also been a remarkable readiness on the part of capital and enterprise to enter fields occupied by consolidated interests. It seems likely that there will be enough outsiders to serve as a healthy check upon monopoly. Whether the pinch of hard times will improve the position of the small producer remains to be seen.

Among distributers the large ones have profited by the heavy demand, and they have increased their strength and prestige. The small jobber has profited in about equal proportion, and has shown the error of those predictions which were plentiful enough at one time as to his passing away. Indeed, the development of the small jobbers doing a local business has been one of the features of the trade, and this tendency promises to continue, perhaps at the expense of the larger distributers.

The years of our prosperity have been singularly bare of many new things of merit in Hardware, since the energies of manufacturers have been so entirely absorbed in endeavoring to supply current demand that there was no time left for the invention and perfecting of new things. Advances and improvements in goods seem to come principally from the stimulus of necessity. Our export trade in Iron and Steel products has suffered because manufacturers generally were unable to take care of the home demand. Europe has, consequently, enjoyed to some extent a brief respite from that fierce competition wth which she has been assailed. When the home demand fails to consume the manufactured products, and our manufacturers look abroad for a market for the surplus, it is likely that the pressure of our competition upon European nations will be fiercer even than in the past.

The change that need give us the most concern is the great growth in organized labor, resulting in a spirit of unrest, of tyranny and of injustice that bodes ill for the future. There is no longer any doubt that public opinion is fast turning against that phase of union labor which is represented by foolish strikes, accompanied by violence and bloodshed and by a spirit of proscription which denies the right to work to the nonunion man. The formation of employers' leagues to protect themselves against the exorbitant and unreasonable demands of union labor ought to be sufficient warning to the leaders of organized labor that the time for force and violence is fast passing away, and make them beware of those times which sooner or later we must again experience, when employment will be scarce and the unemployed many, and the question with the laborer will be that of work and not of membership in a union.

Condition of Trade.

While the country generally is doing a good business and transportation facilities are already taxed, there continues to be a somewhat uncertain and unsettled feeling in regard to existing conditions, owing to the exceptional influences at work and the diverse elements that enter into the problem. The decline in iron, which is suggestive of ultimate reductions in the price of manufactured goods, is a fact which commands the attention of the trade, especially as it is coupled with a weakness in securities, which are apparently settling to a point lower than they should be, according to the sanguine ideas of those who have an exceptional amount of confidence, and hold to the theory that the merging of large interests should have a large influence in maintaining values and in promoting prosperity. Whether justified by circumstances or not, there is no doubt that the Iron market and the condition of things in Wall Street have a disquieting effect on commercial matters. The reports, too, which are current in regard to the crops, and the mention of possibilities of injury from malign weather influences, keep those who are watching developments in a state of uncertainty, notwithstanding the very gratifying fact that the advices, taken all in all, are unquestionably favorable and point to good, and perhaps heavy, crops. In view of these conditions there is no doubt that buyers are exercising caution in their purchases and are not contracting far in advance of early needs. Meanwhile the volume of business, especially with the jobbing trade, is large, and reports generally hopeful as to the outlook for the remainder of the season. Prices are without important change. Manufacturers, though more desirous of securing business than they have been for some time, are, as a rule, maintaining prices well, but the lines of goods on which slightly lower quotations are being made are increasing. These reductions in prices, which are mostly confined to heavy goods, are usually only of moderate extent, and leave the great bulk of Hardware and allied lines unchanged and held at steady and in many cases firm prices. The general policy of buying what is needed for current business without apprehension of a material change in price is regarded as justified by conservative counsels and has the sanction and practice of representative houses in the trade.

Chicago.

(*By Telegraph.*)

In many respects the Hardware interest shows more vitality and strength than any other line closely identified with the Iron and Steel industry. While conservatism is reflected in purchases as in most other lines, the volume of current business and the outlook for the fall are encouraging. The tonnage of staple products which

is being distributed, in standard lines at least, is running considerably ahead of corresponding periods of a year ago. The Wire and Nail trade are in especially good condition, the accumulated stocks of the summer going rapidly into consumption through jobbers and the manufacturing trade specifying liberally on contracts recently placed. Manufacturers of Tools, especially Hatchets, Hammers and Saws, are still unable to supply the wants of customers promptly, although considerable improvement has been made over conditions of a year ago. Prices, too, on these goods are generally well maintained. Manufacturers of Scythes report that the schedule which was in force a year ago is to be maintained this year, and are seeking business on this basis, although jobbers seem indisposed thus far to place large contracts, holding out for better terms. Manufacturers of small Agricultural Implements, Hoes, Rakes, Forks, &c., postponed action in establishing prices for the season until September 15. The announcement of the schedule is expected at any moment. The associated manufacturers of Builders' Hardware are reported to be adjusting prices of fine goods, but are not yet ready to make announcement. It is understood, however, that conditions are improved, there being a better understanding, and prices will be better maintained through the entire list, especially on fine goods, but keen competition is still reported in Butts and Hinges and in lower grades of manufactures. There are rumors of pending consolidations of Lock and Screw companies, but these reports cannot be verified, and in fact are given but little credence. It is reported that an effort is to be made to consolidate a number of manufacturers of Steel Castings, 21 having agreed to the conference in New York having this end in view. There is but little new business—that is, large contracts—on Builders' Hardware which will be placed immediately in this territory, but there is a moderate amount of current business coming from buildings which were begun in the summer. The outlook for new structures is not encouraging, the labor situation being the one discouraging factor. There has been a moderate volume of business in Heavy Hardware, and with the exception of Bolts and Nuts, which have suffered a decline of about 5 per cent. within the last ten days, prices have been well sustained. Chain has been selling slowly, and Washers have been quiet. Screws and Rivets have sold moderately well, one recent contract for 28,000,000 Rivets having been closed. Nearly all jobbers report a fair volume of business, which compares favorably in tonnage and even in prices with a year ago, although in some instances merchants have failed to meet the record of last year. Mail orders have been especially liberal during the week, and the movement of fall goods on previous contracts has been accelerated. In the usual line of Coal Hods, Stove Boards, Stove Pipe, Elbows, Wheelbarrows, Scoops, Shovels, Spades, Snow Shovels, Axes and Lanterns, the outgo has been especially noticeable. Theere has also been a fair demand for Kitchen Utensils, Tools, such as Hammers, Hatchets, Saws, Planes, and also for Ammunition, Carvers and Cutlery. There has been a trade in Shelf Goods, especially in Specialties, and what might be termed "side lines," including Leather Soles, Oil Cloth Rugs and similar goods. A little easier tone and somewhat lower prices are reported for Sisal Rope. Oil Cloth and Rugs, such as are handled by jobbers, are reported to be scarce and difficult to obtain. The demand for Wire and Nails and Galvanized Goods is reported much improved. The encouraging report of the Government on the corn crop for September has been somewhat dampened by continued heavy rains in this section, but even with due allowance for frosts and damage by water the best authorities seem inclined to the opinion that we shall have at least a 2,000,000,000-bushel crop, the latest report of the Government indicating a crop of 2,282,000,000, which while less than the record crop of a year ago, is not only above the average for the last ten years, but the largest, with a single exception, in the last decade.

St. Louis.

(By Telegraph.)

While trade conditions with our Hardware jobbers has been exceptionally good the past few weeks, the advent of fall brings increasing business, and September thus far has been marked by very good returns. Goods of an agricultural character, such as Corn Huskers, Corn Knives, Hay Tools, &c., are in quite lively demand. Stove goods, and especially Air Tight Heaters, are selling in large quantities, and the principal jobbers who control special brands of this class make an especial effort to feature the line. Local transportation conditions have been an important business feature under consideration of late, and, from reports, the committee of business interests have the Terminal Railroad Association in a fair way to grant certain concessions, which will greatly relieve the present congested and unsatisfactory state of affairs in the matter of more prompt delivery of goods.

Omaha.

Lee-Glass-Andreesen Hardware Company.—A glance at the trade conditions existing at the present time in the trans-Missouri region does not reveal any essentially new features. Too much precipitation and cool temperature has retarded somewhat the maturing of our staple product—corn. An early frost would greatly diminish the yield of marketable corn, and this contingency seems to be the only one to be feared. Otherwise the situation presents no drawbacks, either real or apparent.

Trade may be reported as very satisfactory. Country merchants are buying freely and meeting their obligations with reasonable promptness. Prices are practically unchanged and the market is firm, with no disposition apparent to shade legitimate values.

Cleveland.

The W. Bingham Company.—The Hardware trade in this section is exceedingly good for this time of year. Orders through salesmen and by mail are coming to us in good volume and well assorted lines. The continued hot weather will be very favorable for the corn crop, which will soon be harvested and will put a lot of money into circulation. It is a well-known fact that when farmers have good crops they buy freely of necessities as well as of luxuries, and merchants in all lines have a good trade and are benefited thereby.

Early orders taken for fall goods, such as Sheet Iron, Elbows, Stove Boards, Coal Hods, Skates, Cutlery, Guns and Ammunition, are going forward. Those who did not order these goods early may be troubled somewhat to get just the assortment they want, but we expect to be able to get our stock assorted again and be ready for those who delayed ordering early. Prices continue to be steady and firm. Collections are quite satisfactory.

Louisville.

Belknap Hardware & Mfg. Company.—The market is about in the condition that we forcasted in our previous letter—namely, not over supplied with goods. While the large and constant demand keeps the factories, which are running, reasonably well employed, many of them have run so hard and unintermittently the last few years that they are closed down for repairs and now find that these repairs are more extensive than was at first supposed necessary, consequently the shutting down of many factories is prolonged.

With the crop prospects and prices, our main fear is for lack of transportation facilities later on. The water courses are rather low in the Mississippi Valley, so that the railroads will be overtaxed when the full tide of shipments is on. As it is, they have all they can do to move the merchandise of the country, much less its grain crops in addition.

The volume of business is satisfactory, and most orders are for immediate shipment.

San Francisco.

Pacific Hardware & Steel Company.—The very frequent applications for positions that have been filed with us of late by traveling representatives of Middle West houses has been a matter of considerable comment among us. It seems as though a large percentage of the traveling force of our Middle West competitors were endeavoring to make a permanent connection on this coast. This is a matter which must of course interest every buyer of Hardware and leads to but one conclusion—the men that

are in actual competition against the Pacific Coast jobbers find their occupation unprofitable and are endeavoring to connect themselves with local houses, with the full knowledge that the Pacific Coast retailer is surely reaching the conclusion that the market for the purchase of his goods is with the Pacific Coast jobber. Our own observations of the tendency of the times would seem to be in line with this conclusion. The business of all the Pacific Coast jobbers is constantly growing, not so much because of sales to new customers, but because the retailers are gradually buying more and more of their goods on the coast, and have no doubt found it profitable so to do. With prices as high as they have been, we are all anxious to do our business on a minimum stock, which perhaps also accounts for the increase noted.

On the whole, business has been extremely active, and there is considerable comfort in being able to report beyond this that from present prospects we have every reason to hope for at least a continuance of the good times of the past few months. Some of us are even so hopeful that we think the immediate future looks even brighter than the past.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—Complaint of feed being short comes from our stock ranges, and cattle are selling at ¼ and ½ cent off from last year, because buyers realize that cattlemen will have to sell.

Our so-called "Sheep King" has arranged to ship 7000 head of sheep East during this month on his own account, as he cannot afford to feed. The advantage of having two strings to one's bow is shown by there being shipping in our harbor to take 20,000,000 feet of lumber in September, against 12,000,000 feet in August. The railroads having raised rates, shipment is made by water.

The weather has not been favorable for harvesting operations, and much uneasiness prevails as to whether all our crops will be saved. Business holds up fairly well for the season, it being between hay and grass until the harvest is complete and safely stored.

Collections are satisfactory, and indications are they will be better as soon as the farmers loosen up and market their products.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—The demand for Hardware in this market is excellent for this season of the year. The weather has been unusually warm and therefore not very conducive to great effort in mercantile or other pursuits, but the excellent growing crop and splendid prospects for future business have caused everyone to exert themselves in their various avocations.

For the past three weeks we have had very dry, warm weather, which has been very injurious to pastures, gardens, fruits and vegetables, and we are sorry to have to report that in some sections it has injured the cotton crop slightly and materially injured the late corn crop. Notwithstanding all this, we have a magnificent growing crop of cotton, corn and tobacco, far above the average.

Collections in wheat growing district are not as good as we would like, but, taken altogether, collections are not noticably bad.

New Orleans.

A. BALDWIN & CO.—Conditions in this section are all that could be desired, and the prospects for the future are very bright. The cotton crop has deteriorated some, but corn will yield handsomely.

NOTES ON PRICES.

Wire Nails.—Demand continues to show improvement over that of previous weeks. The tone of the market is steady. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots	$2.00
Retailers, carload lots	2.05
Retailers, less than carload lots	2.15

New York.—An increase in orders is noticeable from nearby points, while city demand continues in about the same volume as for some time. The market is firm at the following quotations: Single carloads, $2.20; small lots from store, $2.25 to $2.30.

Chicago, by Telegraph.—The volume of new orders and the tonnage shipped on contracts exceed these of a year ago, and some mills are running double time, accumulated stocks of the summer having already been heavily drawn upon. The outlook is certainly encouaging, and the market is stronger in tone, sales being made at $2.15 to $2.20 in carload lots, f.o.b. Chicago, the inside price to jobbers and the outside to retailers. Less than carload lots sell at 5 to 10 cents higher. For galvanizing 75 cents per keg and for tinning $1.50 extra per keg is charged.

Pittsburgh.—The trade are placing orders for Wire Nails more liberally than for some time, and specifications on contracts are coming in quite freely. The mills are making prompt shipments from stock. We quote $2 in carloads to jobbers, $2.05 in carloads to retailers, and $2.15 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg is charged and for tinning Nails $1.50 per keg extra.

Cut Nails.—The anticipations for a good fall business are being realized to a certain extent by a fair demand. Quotations are as follows: $2.15, base, in carloads, and $2.20 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—There is no perceptible change in local conditions. Demand is fair, and compares favorably with that for Wire Nails. Quotations for carloads and less than carloads are as follows: Carloads on dock, $2.29; less than carloads on dock, $2.33; small lots from store, $2.40.

Chicago, by Telegraph.—There has been a moderate movement in Cut Nails, and if anything the situation is slightly improved, but supplies are ample and the market remains steady on the basis of $2.30 in carload lots and $2.35 for less than carload lots for Steel, Chicago. Iron Nails are quiet, but the supply is only moderate and sales are made at $2.45 to $2.50 per keg from store.

Pittsburgh.—There is a moderate demand and the mills are able to ship out promptly on receipt of orders, having large stocks on hand. Prices are fairly strong, and we quote: Steel Cut Nails, $2.15, base, in carloads and $2.20 in less than carloads; Iron Cut Nails, $2.25, base, in carloads and $2.30 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The Western demand shows a slight excess over that of a year ago at this time. In the East activity is not so marked. Quotations are as follows, f.o.b Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.30	$2.60
Retailers, carload lots	2.35	2.65
Retailers, less than carload lots	2.45	2.75

Chicago, by Telegraph.—Both the combination and the independent mills report a liberal volume of business, new contracts coming forward rapidly and shipments on previous orders being quite liberal. The outlook was scarcely ever more encouraging than at present. The tone of the market continues strong. Galvanized Wire is selling on the basis of $2.75 to $2.80 in carload lots, and Painted at $2.45 to $2.50, the outside price being to retailers. For small lots 5 to 10 cents extra is charged. Staples in carload lots sell as follows: Polished, $2.30 to $2.35, and Galvanized, $2.70 to $2.75, the outside price being to retailers.

Pittsburgh.—New tonnage so far this month shows a considerable increase over August, and the outlook is good for a heavy fall trade. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days: Painted, $2.30; Galvanized, $2.60, in carloads to jobbers; Painted, $2.35; Galvanized, $2.65, in carloads to retailers; Painted, $2.45; Galvanized, $2.75, in small lots to retailers.

Smooth Fence Wire.—Specifications on contract orders are being received at the mills, together with new business. Shipments are being made promptly from stock. The activity in this line is more pronounced in

the West than in the East. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.90
Retailers, carloads	1.95
Less than carloads	2.05

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12&12½	13	14	15	16
Annealed	Base.	$0.05	.10	.15	.25	.35	.45	.55
Galvanized	$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago, by Telegraph.—The outlook continues extremely encouraging, there being urgent demand for prompt shipment on contracts and new business being booked, which in tonnage exceeds the corresponding week of last year. The market continues firm in tone, prices being as follows: Nos. 6 to 9, $2.05 to $2.10 in carload lots on track, and $2.15 to $2.20 in less than carload lots from store; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Pittsburgh.—Some good sized contracts for Fence Wire have been placed by consumers, while jobbers are placing orders quite freely. The mills have good sized stocks and are shipping out promptly on receipt of order. Plain Wire, $1.90, base, for Nos. 6 to 9 in carloads to jobbers, $1.95 in carloads to retailers and $2.05 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Cordage.—Quotations, which manufacturers of only high grade Manila Rope are not willing to meet, are being received by the trade. The cheaper grade is said to be a darker color than the regular Manila Rope. Some manufacturers report an excellent demand for Cordage, while others refer to the volume of business as satisfactory for the season. Quotations, on the basis of 7-16 inch diameter and larger, are as follows: Mixed Sisal, 8 to 8½ cents per pound; Pure Sisal, 9 to 9½ cents per pound; Manila, 11½ to 11¾ cents per pound.

Shovels and Spades.—A regular meeting of the associated manufacturers of Shovels and Spades was held in this city last week, and existing prices were reaffirmed for the quarter beginning October 1. There was only one exception, which was made in the price of a special Shovel sold principally on the Pacific Coast. A reduction of something like 15 per cent. was made in the price of Steel Snow Shovels, which are not regarded as among the regular association goods, although prominently made by the associated manufacturers. This reduced price is regarded as putting them at a figure which will make competition somewhat difficult. The association is referred to as in satisfactory condition, notwithstanding the fact that some outside manufacturers are producing an increasing line of goods. It is understood that the association will hereafter make the purchase of Snow Shovels from its members a condition of receiving rebate on the regular goods.

Whips.—The Whip industry is in a somewhat unsettled condition, although the volume of business is entirely satisfactory to the manufacturers. The trouble is with prices, present and future. For several years, until February, 1908, the Whip Manufacturers' Association existed to maintain a schedule of prices which permitted of a satisfactory margin of profit. The association was formed for this purpose. Prices were advanced and a new order of things was inaugurated and continued for some time until distrust followed charges of cutting the schedule. Finally in February last the association was disbanded and the home office at Westfield, Mass., where at least 80 per cent. of the Whips produced in America are manufactured, was closed for good. Sharp cutting of prices came with the collapse of the association. One result was an increase in the volume of business, which was some alleviation of the troubles of the manufacturers. But on the other hand the increase came because prices were reduced. This cutting has continued, in the face of sharp advances in some of the materials which enter into the manufacture of Whips. Cotton thread is an important item. The United States Whip Company, the combination organized several years ago, who produce at least one-half of the American Whips, use 15,000 pounds of cotton thread a month. The advance on cotton thread is 3 and 4 cents a pound, owing, of course, to the condition of the cotton market. Whalebone is almost out of the market, so scarce it is, and reports received thus far from the whaling fleet do not indicate that the season's catch will amount to much, so there is a certainty of high prices for whalebone. The current prices of rawhide are not encouraging. Rattan and reed are no cheaper; neither are they likely to be. Glue is another big item among raw materials, as is indicated by a recent contract for 45,000 pounds placed by the United States Whip Company. The price of varnish keeps up. The only item of raw material that is cheaper is iron, and iron is about the least important of all items in the Whip industry. In consequence of these conditions the manufacturers assert that prices must advance if the business is to be continued at any sort of a profit. Some manufacturers go so far as to insist that business will be done at an actual loss at present prices. The high class, expensive Whips are not included in this statement because the raw materials do not form so important a factor of expense in the manufacture of these classes of Whips as in cheaper grades.

Glass.—At a meeting of the National Window Glass Jobbers' Association held at Pittsburgh last week the attendance was small, and a postponement was taken, with the understanding that another meeting would be called in the near future. It is said that dissatisfaction exists because no practical benefit has been received by the members during the past year, and that the annual maintenance costs about $20,000. Under these conditions there is a possibility of the association disbanding. No improvement has taken place in market conditions. The demand is light, and it is reported that manufacturers are offering the product of the last fire below the present cost of manufacture. At the present rate of demand it is estimated that there is enough Glass to fill requirements for at least the next 60 days, which will bring it to the middle of November. During December the inducement to stock up and inventory the Glass will not be great. This, probably, will throw business over into the new year. There is a likelihood of the American Window Glass Company's blowing machine playing an important part in the Glass market in 1904 if not sooner. While discounts of 90 and 10 per cent. for small lots of the first three brackets, and 90 and 15 per cent. for sizes above, are supposed to be the basis upon which sales are to be made, there is not enough business at this point to make a market.

Oils.—*Linseed Oil.*—Reports of destructive storms in the Northwest have caused an advance in flax seed and strengthened the Oil market to the extent of an advance of 2 cents per gallon by city crushers. Demand at previous figures has been for small lots, but active and prompt delivery has been urged. It is not impossible that the damage to seed has been overestimated, as upon former similar occasions. Quotations are as follows: City Raw, in lots of five barrels or more, 39 cents; in lots of less than five barrels, 40 cents per gallon. Out of town brands of Raw are quoted, according to quantity, at 37 to 39 cents per gallon.

Spirits Turpentine.—An advancing tendency in the Savannah market, together with light local supplies, have sustained prices at this point to a considerable extent. It is difficult to calculate the future of Turpentine on account of speculative operations at the South, and no confidence is placed in the market. Quotations, according to quantity, are as follows: Oil barrels, 59 to 59½ cents; machine made barrels, 59½ to 60 cents per gallon.

THE GILBERT & BENNETT MFG. COMPANY, manufacturers of Wire Cloth and Netting, have removed their New York offices from 44 Cliff street to 277 Broadway, corner Chambers street, rooms 1503-1504, and are now ready to receive visits from the trade.

RETAIL HARDWARE DEALERS' MUTUAL FIRE INSURANCE COMPANY OF MINNESOTA.

FOLLOWING is the last quarterly financial statement of the Retail Hardware Dealers' Mutual Fire Insurance Company of Minnesota, as prepared by M. S. Mathews, secretary, Boston Block, Minneapolis:

STATEMENT FOR QUARTER ENDING AUGUST 31, 1903.

	Insurance written.	Renewals.	Premiums.	Return premiums.
June	$121,000	$70,400	$2,518.36	$366.55
July	91,800	56,700	2,147.45	315.77
August	83,840	44,300	1,642.83	266.62
Totals	$296,640	$171,400	$6,308.62	$908.94

Insurance in force May 31	$1,047,447
Written during last quarter	296,640
Total	$1,334,087
Less terminations	191,754
In force August 31	$1,152,333

Financial Condition.

On hand, May 31	$27,056.48	Losses	$1,954.75
Receipts, June	2,309.70	Expenses	1,146.56
Receipts, July	1,772.82	Cancellations	19.96
Receipts, August	1,133.23	Return premiums, expirations	60.54
June interest	187.50	Balance on hand	29,278.82
Total	$32,459.73	Total	$32,459.73

Itemized Expenses.

Attorney's fees	$50.00
Directors' per diem and M.	333.97
Rent	20.10
Advertising, printing and stationery	114.00
Miscellaneous office expenses	104.25
Salaries	330.00
Adjusting losses	92.62
Rebates on improved risk	5.38
Exchange	11.50
Postage	58.00
Secretary, traveling expenses	24.74
Total	$1,146.56

Itemized Fire Loss.

June 20, C. H. Hoton, Hustler, Wis.	$800.00
Jy' 2, Cooper & Day, Vernon Centre	70.00
July 18, E. C. Dedrick, Langdon, N. D.	1,000.00
August 18, Nelson & Tone, Spring Grove.	84.75
Total	$1,954.75

Summary.

1903, premiums to date	$21,800.24
Losses to date	3,621.01 = 16 per cent.
Expenses to date	2,455.04 = 11 per cent.

FIRE IN CHAMBERS STREET.

A FIRE occurred on the fourth floor of 88 Chambers street, New York, Tuesday evening, about 5 o'clock, in the premises occupied by Treinis Bros., who manufacture Sporting Goods, such as Punching Bags, Boxing and Ball Players' Gloves, &c., which practically destroyed the contents of that loft and the one above, used for storing Thermometers and similar goods, belonging to an importing house who do the main portion of their business in an adjoining building, which was not injured. It was caused by a girl employee attempting to light the gas, when a lighted matchhead broke off and flew into a bundle of waste. The remaining portion of the building below the fourth floor is tenanted by a number of Hardwaremen, whose only loss is water damage, their goods having been for the most part protected by the water proof blankets of the salvage corps. The street floor is occupied by R. Christensen, dealer in Cabinet and Upholsterers' Hardware, who also has as tenants the Meriden Cutlery Company, Table Cutlery; Frederick Pfeiffer, Hardware Specialties; D. W. Gray, jobber of general Hardware, and D. J. Hughes, manufacturers' agent for Bolts, Nuts, Rivets, &c. On the remaining floors above are Lamar Van Syckel, Hardware Specialties; T. L. Webster, Brass Goods and Upholsterers' Hardware, and the Cooke Mfg. Company, Rubber and Metal Hand Stamps.

TRADE ITEMS.

JULIAN A. HURDLE, who is identified with the firm of Charles Morrill, 277 Broadway, New York, manufacturer of the Morrill Saw Sets, Bench Stops, Hand and Bench Punches and other Tool Specialties, will devote a part of his time hereafter to public patent practice. After Mr. Hurdle's admission to the bar 29 years ago he was for 13 years patent attorney for the late Charles Morrill, and all his time for the past ten years or so has been given to the business management of the house. His specialty, for which his long experience in successfully defending their various patents particularly qualifies him, is along the lines of mechanical and design patents, copyrights, trade-marks and kindred work, he being eligible for practice in the United States courts of this district, the United States Supreme Court at Washington and at the bars of several States in which he has at different times appeared as attorney. His business address will be as heretofore, 277 Broadway, New York, with Charles Morrill.

AMERICAN IRON & STEEL MFG. COMPANY, Lebanon, Pa., have recently opened a sales office for the New England States at 220 Devonshire street, Boston, the office being in charge of F. W. Brigham. They state that requests for prices, orders and inquiries about shipment of material addressed to this office will receive immediate and intelligent attention at the hands of experienced sales people. Important improvements in and extensions to their plants, begun more than a year ago, have recently been completed by the company, and all their mill and factory departments are referred to as in splendid physical condition. Stocks which had been depleted have been replenished, and the company believe that in their warehouses at Lebanon and Reading they have to-day the most complete stock of Bolts, Nuts, Rivets, Washers, Turnbuckles and kindred articles to be found in the country. They roll in their own mills all material used in the production of Bolts, Nuts, &c.

WOOD & Co., Marquette Building, Chicago, announce that they have secured the agency for the sale of the Maxon-Miller Jack Company's Improved Lever Jacks.

THE MAN BEHIND THE COUNTER SHOULD KNOW ALL ABOUT HARDWARE.

Success depends largely upon your knowing the goods handled in the store.

A WISE MAN said, "Know thyself," but if he had been in the retail mercantile business he would also have said, "Know thy goods." It is not possible for any Hardware clerk to know too much about the goods he is handling. The clerk should familiarize himself with the names of manufacturers and their trade brands; in fact, he should know about every article in the store, not only the selling price and the use to which it is made, but also the concern that makes it. Learn, if possible, how the goods are made and why the particular brand your store is carrying is superior to any other brand.

But the clerk may ask, "How am I to learn all of this; where will I get the knowledge? No one in the store will take the pains to tell me." Three ways in which this knowledge may be gained present themselves and are easily accessible to every Hardware store employee. First, I should say read the trade publications from cover to cover, advertisements, notes on new goods and prices. This will put you in a position to know about not only the goods in your own store, but possibly the goods that the competing stores may be handling.

A few years ago I was in a Hardware store in one of the old New England towns and I asked the proprietor to let me see a copy of the previous week's *Iron Age*. After looking about for a moment he said he remembered that the copy would not be there—one of his clerks always took it home the following week. That merchant continued by saying: "That boy has been in this store only a year, but he is better posted than any clerk I have. He takes *The Iron Age* home and spends much of his evenings in reading it."

Four years later I was in the same store again and found that this boy had become head clerk and was buying more than half the goods handled in that store, and that he knew his business, too.

A great many things can be learned about the goods and the way they are manufactured from the traveling salesmen who call upon your firm. As a general rule, you

will find these men glad to give any information about the process of manufacture. Specialty men are extremely glad to talk to the man behind the counter and give him selling points about their article.

Much can be learned from catalogues. In every Hardware store there are great stacks of catalogues. Study these; study up prices. A customer, realizing that a clerk is well posted on the goods about which he is talking, at once has confidence in him and many a sale is made because of the clerk having this knowledge of the business. I.

THE ATLANTIC CITY CONVENTIONS.

PREPARATIONS are now being made for the ninth annual convention of the National Hardware Association, which will be held at Atlantic City, N. J., on November 18, 19 and 20. The official headquarters will be at the Hotel Rudolph, which is capable of accommodating 1000 persons. At the same time and place the annual convention of the American Hardware Manufacturers' Association will be held. Already advices have been received from enough of the members of the jobbers' association to justify the belief that it will be the most largely attended convention in the history of that organization. Many of the prominent manufacturers of Hardware and related lines have also signified their intention of being present, and quite a number of them will be actively identified with the programme. While arrangements have been made for relaxation during the evenings, this will not interfere in any way with the business sessions of the conventions. The present intention is to have an open session on Wednesday morning, November 18, and to have at least four executive sessions for the discussion of the business of the association. As in the past, the business side of the conventions will occupy the leading place, though the social side will not be neglected.

Arrangements are already under way for bringing a large delegation of the Western trade to the convention. A special train has been engaged, which will run via the Pennsylvania from Chicago to Atlantic City.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS *for catalogues, price-lists, quotations, &c., have been received from the following houses:*

FROM P. N. HARLEY, formerly secretary, treasurer and manager of the Watt-Harley Hardware Company, Waycross, Ga., who has withdrawn from that concern, and will shortly open up in business on his own account in Waycross under the firm name of P. N. Harley Hardware Company. The new firm desire catalogues and quotations pertaining to Hardware, Stoves, Tinware, Crockery, House Furnishing Goods and Iron Pipe and Fittings.

FROM THE POWELL HARDWARE COMPANY, El Dorado, Kan., who have bought the Hardware, Stove, Tinware, Agricultural Implement, Paint and Oil, Sporting Goods, Vehicle and Machinery business formerly conducted by Masters Bros. The company have incorporated with a capital of $25,000, and are making a number of radical improvements in the store, putting in elevator, Warren shelving, the most approved showcases, &c.

FROM EUGENE W. BULL, Kent, Conn., who has bought the Stove, Tinware and Plumbing business of Jerome F. Gibbs. Mr. Bull intends to enlarge the line formerly carried.

FROM DOHERTY BROS., Clare, Mich., who have succeeded to the Hardware, Stove, Farming Implement and Sporting Goods business of their father, Senator A. G. Doherty, who has retired after 22 years' connection with the trade. The store has been enlarged, and a number of improvements made in it.

FROM THE MACCRACKEN HARDWARE & IMPLEMENT COMPANY, Lancaster, Ohio, who have been incorporated with a capital stock of $25,000. The new company comprises W. B. Maccracken, who has been in the Hardware business in Lancaster since 1873, and his three sons.

FROM W. K. POST & SON, Emerson, Iowa, who have purchased the Hardware, Stove, Tinware and Sporting Goods business formerly carried on by G. H. Gill.

FROM W. A. DUXBURY, Canova, S. D., who has bought the business formerly conducted by W. W. Lowell & Co. Mr. Duxbury has completed a new store, in which he is now comfortably settled.

FROM MCLENDON HARDWARE COMPANY, Waco, Texas, who are intending to incorporate with a capital of $200,000, and carry on the wholesale and retail business in Shelf and Heavy Hardware, Stoves and Tinware and Agricultural Implements. The company's officers will be: S. P. McLendon, president; J. S. McLendon, vice-president, and Geo. K. McLendon, secretary and treasurer. The company are successors to McLendon, Duncan & Co., who have been dissolved.

FROM ANDERSON HARDWARE COMPANY, Atlanta, Ga., who have bought the Sporting Goods stock of F. G. Byrd & Co., and moved it to their store. They have also bought the Hardware stock of Walker & Reynolds of that city, consisting of about $8000 worth of Builders' Hardware, Tools and General Hardware. The company carry on a wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware, House Furnishing Goods and Sporting Goods.

FROM KELLY & MOSELEY, who are intending soon to open up in business in Marion, Ill. Their line will comprise Shelf Hardware, Stoves, Tinware, Sporting Goods, &c.

AN ATTRACTIVE BOOKLET.

THE JOHN E. BASSETT & CO., New Haven, Conn., recently issued an interesting and attractive booklet entitled "The Master of Arts," the first page of which, reduced, is reproduced herewith to illustrate the general style and make-up. The booklet is effectively gotten

The Art

Charles Lamb in one of his essays writes that the esculent qualities of roast pork were first discovered through the burning of a house which sheltered its owner's pig, thus leaving a savory roast among the ashes; and goes on to say that until a simpler method of cooking was devised, incendiarism and roast pork were almost synonymous. Although this whole story was probably a roast—and Lamb was always roasting some one or being roasted—the fact remains that cooking has developed from crude and utilitarian beginnings into a science and an art.

up and among the goods to which attention is called are Enameled Kitchen Ware, Tinware, Pots and Kettles, Molds and Cutters, Refrigerators, Ice Cream Freezers, Wooden Ware and Baskets, Brushes and Dusters, Knives, Forks and Spoons. The last page of the booklet is occupied by a recapitulation of some of their prices.

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE, NORFOLK ST., LONDON, W. C., Sept. 5, 1903.

The Week's Hardware Trade.

THE most important event during the week has been the break of the cotton corner. The result has not been immediately felt, but it is regarded as certain that trade in Lancashire will during the next week or two visibly improve. The Hardware trade has suffered considerably owing to this cause. The autumn demand for Hardware comes slowly, and is distinctly below the average. Retailers complain that their stocks are unduly heavy, and that the cold, wet weather has spoiled their trade in season goods, and especially garden furniture and irrigating appliances. Owing to the depreciation in Consols and other leading securities, the upper middle and higher classes are restricting their purchases, while the labor troubles in South Wales, the recent cotton famine in Lancashire, and the depression in the Clyde shipping trade, have all had or are having a depressing influence upon the Hardware trade. The building trade is, on the whole, quiet, but special orders are in for some large works, new hotels, offices and asylums, so that some of the makers of Builders' Castings and Fittings, Girders, Pillars, Drain Traps, Guttering and Spouting, &c., are busy. During the week there has been a fairly large distribution of orders for Electro Plate and Britannia Metal Ware for London and other home markets. Silver Goods are in brisk request; but, on the whole, the trade cannot be described as healthy. There is some slight improvement in the Metallic Bedstead trade. In the tin plate working branch demand runs strongly on Kettles, Saucepans, Lanterns, Lamps and Tea Trays. Prices are maintained owing to the scarcity of the raw material, consequent on the lockout in the South Wales tin plate trade. Nothing of interest relative to the export trade has occurred this week.

A Fiscal Tariff and the British Hardware Trade.

During the next two or three months we may anticipate a stirring and dramatic discussion upon the fiscal proposals vaguely outlined by Joseph Chamberlain, the Colonial Secretary. In my opinion, the currents of British economic and commercial thought are set dead against any change in our system of free imports. Recent Parliamentary by-elections point unmistakably to this. On the other hand, Joseph Chamberlain is the most forceful politician in Great Britain at the present moment, and when he takes to the platform in earnest, he may manage to create an entirely new political situation. Be that as it may, it is fitting that all those who have trade connections with Great Britain should endeavor to appreciate the actual bearings of the controversy upon the British Hardware trade. I propose, therefore, to deal with some aspects of the question in this article.

The subject naturally falls into two divisions: 1, The probable effect upon the trade of a preferential tariff; and, 2, of a protective tariff. Before the influence of either contingency can be truly gauged it is necessary to inquire into the relations existing between the different grades of the trade. I will divide the trade roughly into three divisions: *a*, the manufacturer; *b*, the jobber; *c*, the retail distributer. The Hardware trade differs from the heavier metal departments in that it relies almost entirely upon the retailer. Whatever, therefore, aids or hurts the retailer, its corresponding effect is felt by the jobber and the manufacturer. If we confine our attention for the moment strictly to the home trade, it becomes self evident that, unless the retail customer is economically benefited by a preferential or protective tariff, the whole scheme falls to the ground. It must not be a problematical gain; it must be proved to the satisfaction of the mass of the people that their real wages, as distinct from their face value, must increase. It is not to be expected that a fiscal system, the principles of which become an integral part of the creeds of all political parties, shall be lightly cast aside for a merely problematical gain. This becomes all the more obvious when we remember that the almost universal impression in this country is that under a protective system the purchasing value of wages tends to decrease; or, in other words, that the standard of living is adversely affected.

I will first assume that if a preferential tariff be imposed,

THE COST OF FOODSTUFFS WILL RISE,

and that therefore, unless wages advance in corresponding degree, the purchasing capacity of the lower middle and artisan classes will be restricted. If this be so, one of the first trades to be hurt is the Hardware trade. Take the case of an artisan whose wages remain stationary but whose cost of living slightly advances. He makes a weekly contribution to his trade union, his sick and benefit club, makes some small weekly provision for a yearly holiday, and otherwise expends his weekly wages in the necessaries of life. Owing to the weakening of his economic power, he finds it necessary to curtail at some point or another his weekly expenditure. He does not reduce his purchases of foodstuffs, but rather refrains from buying various articles which otherwise he would purchase. There is a large category of manufactured articles which just verge on domestic necessity, but which at a push can be done without. Domestic Utensils, Kitchen Furniture generally, Fenders and Fire Irons, Lamps, a number of small metal appliances of one sort and another are just the very things that an artisan buys when he has a little spare cash. It is these very things which are, so to speak, the bread and cheese of the Hardwareman's business. If, therefore, the artisan's standard of living be reduced, it follows that the Hardwareman must at once experience a shrinkage in his yearly turnover, or, in the alternative, will find himself selling cheaper articles at a less profit. Indeed, if it comes to rigid analysis, these two are not alternatives; they are probably complementary. Owing to the American cotton corner, the Lancashire cotton trade is experiencing a bad spell. The retail Hardwareman has been almost the first man to be adversely affected by this temporary trade depression. Stated in other words, the Hardware retailer is vitally concerned in the maintenance of an average artisan wage, which must be considerably above the mere wages of sustenance.

But it is contended by the advocates of fiscal change

THAT WAGES WOULD ADVANCE

under a Protective Tariff. The argument, briefly summarized, is that more work would be found for labor in Great Britain, that there would be greater activity in the factories and work shops, that prices would advance and that wages would rise in sympathy. But against this line of argument has to be set the awkward fact that the vast majority of employees in Great Britain are paid either by salary or by time, and that the piece worker is in a large minority. Take, for example, the British Civil Service. Wages are here arranged by act of Parliament, are nearly as unchangeable as the laws of the Medes and Persians, and are even now, under free trade conditions, accounted too low. Then again, there is an imposing army of municipal employees who, while not civil servants in the technical sense, yet are paid upon a system based upon the Civil Service system. But both the civil and municipal services are numerically quite small compared with the large army of clerks and warehousemen, the vast majority of whom would look in vain for any rise in salary. The clerks and warehousemen in their turn are a smaller army than the great mass of the artisans and working classes generally, who depend upon a weekly wage which does not automatically change with the rise or fall of values. It might be politically an easy task to impose a tariff; it is reasonably certain that the vast mass of those who receive fixed wages would find their task herculean to obtain a corresponding advance in wages. On the other hand, it is probable that the piece workers would retain their present economic strength under protection. On the whole, therefore, my own opinion is that the advocates of a fiscal change have up to now completely failed to show that there is the slightest probability of the vast mass of the artisans of this country obtaining a rise in wages to correspond with the increase in the cost of living. This being the case I am convinced that the purchasing capacity of the majority of retail customers would be relatively reduced,

and that almost the first trade to feel the depression would be the retail Hardware and metal trades.

IT NEED NOT BE URGED

with undue emphasis that whatever affects the retail trade must in its turn affect the jobber. This is, of course, axiomatic. But it is to be emphasized that the Hardware jobber in Great Britain is more closely bound up with the retailer than is the case in almost any other trade. Long credit is the rule rather than the exception, and this means that the British Hardware jobber, to all intents and purposes, is the retailer's banker, as well as his merchant. This in its turn means that the British jobber is bound to be hard hit by a preferential or protective tariff. In the home trade, therefore, by the simple process of shrinkage in demand, the British Hardware jobber would be hard hit. His position becomes more difficult and embarrassing when we consider the export trade. I will, however, return to this point later.

The British Hardware manufacturer, so far as the home trade is concerned, lives either upon the jobber or the retailer, or upon both. If, therefore, his clients are adversely affected it follows that he, too, must pay the price. It will be contended that a protective tariff will save him from excessive competition, and that therefore he will obtain for his goods a higher price. It is doubtful, first, if he can obtain a higher price, and, second, even if the higher price could be exacted, whether it would repay him for the increased cost of manufacture. Although I do not think his wages bill would be substantially advanced, yet other increased expenses would be undoubted. Clearly, the man who stands to gain most under a protective tariff is what the French call the *rentier*—the man who is in a position to exact rent in some form or another. The Hardware manufacturer does not experience much difficulty in paying rent for the land upon which his premises are situated, but with the growing organization of the coal owners and the ironmasters he finds an increasing rent extracted out of his business over and above the market value of his raw materials. By this I mean that if the price of pig iron on a competitive basis be x, the price he pays when the ironmasters are associated is x, plus y; y therefore represents the amount paid in increased rent. This goes into the pockets of the ironmasters, the colliery proprietors and the landlords, who exact mining rents and royalties. While, therefore, the manufacturer would be held up by the ironmaster upon the one hand, he is committed to his catalogue prices upon the other, and between these two conflicting forces his lot under protection would be worse than it is now. The Hardware manufacturer, in the nature of things, is compelled to buy in what the ironmaster would consider small quantities. In the higgling of the market, therefore, he exercises but small influence. One of the most striking features of recent economic developments is the growing dependence of the small manufacturer upon external capitalists, whether they be ironmasters, landlords or small investors. It will be within the knowledge of most American readers that, as a general rule, the Hardware manufacturer is but a small employer. Superficially it may appear that a manufacturer in Great Britain stands to gain under a protective tariff; in reality he is not economically strong enough to capture much of the plunder.

PREFERENTIAL TARIFF.

Let us now see what would be the probable position of the British Hardware trade if a preferential tariff were imposed. First of all, it is clear that the Hardware trade is not directly affected, inasmuch as there are no colonial Hardware manufacturers. It is true we buy some Agricultural Implements and furniture from Canada, but in the total it is the decimal of a drop in the ocean. But if for Imperial reasons a preferential tariff is put upon imported American wheat, so that Canada may benefit, the question is whether the British colonies generally would reciprocate with a fiscal preference favoring British Hardware as against American, German or French Hardware. As a matter of fact, Hardware imported into British colonies is but lightly taxed. Canada and New Zealand charge the heaviest taxes; the Australian Commonwealth and South Africa admit the great bulk of Hardware duty free and impose but a small tax upon the remainder. The bulk of imported Hardware into New Zealand, Australia and South Africa comes from Great Britain. It is true that in all these three colonies there is a growing disposition to buy Hardware goods from America and Germany. But these goods are generally precisely those products which, owing to natural advantages, America can supply more efficiently than Great Britain. Unless, therefore, there were an exceptionally heavy preferential tariff it is to be presumed that the present currents of trade would not be diverted in the slightest degree.

In conversation with Australian, Tasmanian and New Zealand importers, I have been repeatedly told that what they buy from America under present conditions they would continue to buy under an Imperial preferential tariff. The Hardware exporter, therefore, would find that he was put to infinitely greater labor and trouble in delivering his goods, would be paying a higher price for British products and would reap no corresponding increase in his colonial trade. It is seriously proposed by politicians in this country that a tariff should be charged upon imported goods by way of retaliation; that is to say, that our respective Governments must argle bargle for changes in the national tariffs. But, inasmuch as we get the most favored nation treatment with practically all the nations of the world, which means that we are on the best available fiscal terms, it is difficult to see how by putting ourselves in a worse position we can hope to get back to a better position by diplomatic circumlocution. The proposition is too absurd to be seriously discussed. Now, the Hardware exports of Great Britain last year were roughly $7,500,000. This, of course, does not include Cutlery, Tin Plates, Cast and Wrought Iron Goods, Galvanized Sheets and other articles; it refers only to unenumerated Hardware. Of this $7,500,000 worth rather less than two-thirds was sold to foreign countries, and rather more than one-third to British colonies and possessions. But we are officially informed that India is not to be considered a part of the new fiscal proposals. This being so, it means that more than two-thirds of British Hardware exports went to foreign countries and less than one-third to the British self governing and Crown colonies. The British self governing colonies are officially recognized as separate fiscal entities, and are so treated by other nations of the world. If, however, a preferential treatment is extended to these separate fiscal entities, it follows that the other nations are bound to take note of it and to demand under the most favored nation clauses similar treatment, or, in the alternative, to place British exports upon the maximum schedules. It thus becomes evident that a preferential tariff would bring but a problematical gain in colonial trade, while it would undoubtedly bring in its train a vast number of embarrassments and difficulties in our dealings with other nations. And if, as is practically certain, British Hardware were placed upon the maximum schedule of European tariffs, it is obvious that to compete with American and German Hardware exporters would be increasingly onerous. The Hardware trade, therefore, either at home or in the colonies, would probably be a serious sufferer under a preferential tariff.

HARDWARE MANUFACTURERS MUST BE PROTECTED.

What, then, would be the position of the Hardware trade under a protective as distinct from a preferential tariff? Clearly, the Hardware manufacturer must be effectively protected. He does a trade either at home or abroad every year of not much less than $60,000,000, while the imports of Hardware and allied goods into Great Britain are inconsiderable. Last year we imported as follows: Cutlery, 4254 cwt.; Cycles, over $400,000; Cycle Parts, over $300,000; Electrical Goods, $3,500,000; Hardware, $3,500,000. This does not amount to much, and in addition, much of it is inevitable. For example, among articles we import from the United States are Wheels, Tin Foil, Typewriters, Rims, Spokes, Copper Wire, Copper Ingots, Lumber, Copper Rods, Agricultural Implements, Zinc Goods, Pig Lead, Radiators and Refrigerators. These are essentially American productions and would be bought in this country whatever might be the

tariff. In addition, American Machine Tools, where quality serves, would still be bought, so that competition in this country with American goods is reduced to a small compass. In less degree these remarks apply to Germany, although here competition is more general. But Hardware and allied goods imported from France are distinctive and likely to persist. A protective tariff, therefore, does not materially benefit the Hardware manufacturer.

THE JOBBER IN THIS CONNECTION

is in some conflict with the manufacturer. The jobber rightly claims that if he has a marketable article he is entitled to sell it. Now, both American and German merchants, agents and travelers are perpetually pushing their goods among the British retail trade, and it stands to reason that increased trade is in consequence done. The country at large benefits, the retailer benefits, the merchant benefits. All these three factors are prompt to argue that it would be unfair that their interest in this connection should be prejudiced merely to protect the Hardware manufacturer.

But under the free trade *régime* a vast *entrepot* trade has developed. Every mail from Europe, from India, from Canada, from South Africa and Australia, indeed from all countries of the world, brings indents to the Hardware exporters of London, Liverpool, Glasgow and elsewhere. This trade is held by the Englishman because he has shipping facilities. These shipping facilities are directly the outcome of our free trade policy. Under a protective tariff one result would be that foreign and Colonial buyers would get into direct touch with American, German and French manufacturers, while under the present arrangement they buy through their British jobber or commission house. This *entrepot* trade, then, is a most valuable factor in the organization of British commerce, and would undoubtedly be menaced by a protective system. Further, innumerable orders for goods, the makers of which are not specified, reach the British manufacturer, which in the total is a large trade, and which he would stand to lose under protection. Thus, although apparently the interests of the jobber and the manufacturer are in conflict under protection, the conflict is more apparent than real. The manufacturer benefits only in less degree than the jobber.

SCARCITY OF CASH.

In my opinion not enough importance is attached to the general scarcity of cash among average buyers. A fortnight ago I had occasion to refer to the well-known case of J. G. Graves, the Sheffield catalogue house. It will be remembered that this gentleman, in his evidence, stated that he had a million customers upon his books; that last year he traded with 655,000 customers, and that he county-courted over 13,000 debtors. This particular class of trade lives almost entirely upon the need for credit which exists among the artisan classes. J. G. Graves is only one of a number of others, and, as a matter of fact, the "tallyman" walks up and down the land seeking whom he may devour. All this points conclusively to a fact which, as I say, is not adequately appreciated—that any further restriction in the purchasing capacity of the artisan must have a seriously depressing influence upon the Hardware trade. This week I have to report that, in consequence of the increasing price of provisions the retail Hardware trade has been hurt. If this restriction were to become general, as it would under a protective *regime*, the economic results would be far-reaching, embarrassing and depressing.

On the whole, I think, the general arguments have been carefully weighed by the man in the street, and unless I am greatly mistaken his verdict will be unmistakably and emphatically for a continuance of free-trade principles.

JOSEPH DAWSON, who has represented Burger & Baumgard, 105-107 Chambers street, New York, Hardware jobbers, for 18 years in Florida and Georgia, leaves New York September 18 for his headquarters, at Orlando, Fla., where he resides. It is Mr. Dawson's custom to spend a month here, going over samples and prices, about this time of the year, and the balance of the 12 months among the trade.

NEW ENGLAND IRON AND HARDWARE ASSOCIATION.

THE September meeting of the New England Iron and Hardware Association was held at the Point Shirley Club, Winthrop, Mass., at 5.30 p.m., Tuesday, September 15, when a fish dinner, after the style of the celebrated dinners formerly served by the late Mr. Taft, who made Point Shirley famous, was partaken of by the company. The privileges of the club were extended to the association and their guests, including the use of bowling alleys, billiard rooms, &c. As intended, this gathering turned out to be more of an outing than a business meeting. There was a large attendance, many of the company going to Point Shirley by early afternoon trains, and all remaining until late in the evening. The arrangements, which were admirable, were in charge of John T. Boyd, chairman of the committee.

AMERICAN FORK & HOE COMPANY.

F. S. KRETSINGER has lately been elected president of the American Fork & Hoe Company, Cleveland, Ohio, succeeding the late Gen. W. H. Withington. Mr. Kretsinger is thoroughly familiar with the Fork and Hoe business, having been for many years president of the Iowa Farming Tool Company, Fort Madison, Iowa, and will doubtless fill the position with great credit to himself and the company. The other officers of the corporation are as follows: W. H. Cowdery, first vice-president; F. L. Andrews, second vice-president; J. W. Klemm, third vice-president; G. B. Durrell, treasurer, and G. H. Kelley, secretary. J. A. Carter has been elected manager of the sales department, while T. H. Russell continues as manager of the purchasing department.

HEAVY HARDWARE JOBBERS' NATIONAL UNION.

THE HEAVY HARDWARE JOBBERS' NATIONAL UNION will meet at the Grand Pacific Hotel, Chicago, Ill., at 9 a.m., Monday, September 21, for the election of officers and other business. On Monday night the union will go in a body to Pittsburgh, where they will be the guests of the Carnegie Steel Company for two days, visiting the various plants of the company. Special arrangements have been made for the trip, as announced by Secretary W. C. Brown.

AMONG THE HARDWARE TRADE.

Basche-Sage Hardware Company have been incorporated with a capital stock of $150,000, taking over the business formerly carried on by P. Basche and Sage & Grace at Baker City, Ore., and the Basche Hardware Company at Sumpter, Ore. The officers of the new company are as follows: P. Basche, president; Chas. M. Sage, vice-president and general manager; D. W. French, secretary and treasurer; C. C. Basche, manager Sumpter branch. The directors of the company are P. Basche, Chas. M. Sage, D. W. French, J. H. Robbins and N. C. Richards. Mr. Basche while president of the company will not take an actice part in the management of the business, and practically retires after over 30 years' identification with the Hardware trade of Oregon. The company will conduct both a wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, Mining Machinery, &c.

Brady Bros. Hardware Company, Jacksonville, Ill., have incorporated with a capital stock of $35,000, the interested parties being Harry B. Brady, William J. Brady and Emma T. Brady. They will continue the wholesale and retail business in Shelf and Heavy Hardware, Stoves and Tinware, Paints and Oils, Sporting Goods, &c. They have recently remodeled their building, which is a three-story structure, 40 x 180 feet.

A. A. Woodworth has lately engaged in business in Centerville, S. D., handling Shelf Hardware, Stoves, Tinware, Agricultural Implements and Sporting Goods.

Pioneer Hardware Store, Placerville, Cal., have incorporated with a capital stock of $24,000. A number of improvements in the establishment are contemplated.

J. R. Pearl and J. K. Weber have bought the J. W. Ross stock at Brownsville, Ore., and will continue the business under the style of Pearl & Weber. Besides Hardware, Agricultural Implements, Stoves, Tinware, Paints and Oils, Sporting Goods, &c., they are carrying carpets and a full line of furniture. They have just commenced the erection of a two-story brick building adjoining their present establishment, which will be exclusively devoted to furniture.

Guy I. Watt has been succeeded in the Hardware business in Independence, Kan., by Watt & Partridge. With the oil and natural gas development many new lines of goods are said to be in demand in that section of the country.

Waterbury Hardware Company, Waterbury, Conn., have been incorporated with a capital of $6000, to carry on the retail business in Shelf and Heavy Hardware, Agricultural Implements, Sporting Goods, &c.

Field Hardware Company have bought the Hardware, Stove and Furnace business formerly carried on by the Howard Hardware Company, Oelwin, Iowa.

A. F. Meyer has disposed of his Hardware business in Hastings, Neb., to the J. H. McGrath Hardware Company, who are building an addition to the store, 22 x 25 feet, and putting in metal ceiling and generally improving the main establishment. The members of the firm are J. H. McGrath, who has traveled for Wright & Wilhelmy Company of Omaha for the past 12 years, and A. E. Murray, who has been employed for the past four years by Mr. Meyer as head clerk.

H. B. Smith has sold his Hardware and Farm Implement business in Portis, Kan., to R. Z. Richolson & Sons, who continue at the old stand.

The Okeene Hardware & Implement Company, Okeene, O. T., have been incorporated with a capital stock of $20,000. The company refer to business as good, and are intending to erect a new brick building, 50 x 100 feet, two stories, with elevator. Harness and tin shops will occupy the top floor. They will also put up in the rear a warehouse, 40 x 100 feet.

Stein Bros. have purchased the general stock of J. Helmann, Hastings, Neb., and have consolidated it with their own.

J. R. Rose & Co., Hornellsville, N. Y., have recently placed in their store a new showcase 12 feet long, 27 inches wide and 3 feet 8 inches high. It is fitted with plush lined trays, which can be drawn out for showing goods. It is intended for Cutlery, Shears, Rules and fine Mechanical Tools.

F. C. Mason & Co., St. Johns, Mich., dealers in Agricultural Implements, &c., have increased their capital stock to $50,000. This move was necessary to provide sufficient capital to take care of their rapidly growing business. The company are erecting a new warehouse, 125 x 40 feet, adjoining their present building. It will be of brick, with cement floor, and will be as nearly fireproof as possible.

FERDINAND BAUMGARD, general manager for Markt & Co., 193-194 West street, New York, large exporters to many countries of American manufactured products and general importers, arrived in New York September 9, on the "Grosser Kurfuerst," from a business and pleasure trip abroad, begun July 2, during which he visited their branches in London, Berlin and Paris.

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FACTORY COST SYSTEM OF ENTERPRISE MFG. COMPANY.

First Article.

WE give in this issue the first instalment of a description of the cost system in use by the Enterprise Mfg. Company, Philadelphia, Pa., which will be of special value to all students of the subject of factory costs, inasmuch as the company are prominent manufacturers of a diversified line, and have given special attention to the business system under which their various manufacturing departments are operated. It thus represents approved methods of ascertaining and tabulating the costs of such products. In order to render the series of articles of as much service as possible to the trade, we give a general description of the plant with an outline of the organization under which the manufacture is conducted.

The business of this great house was built up from a comparatively small beginning, largely by the unremitting attention and unquestioned ability of T. Henry Asbury, who is still the head of the company, though many of the details of its management are now under the charge of his sons, C. W. and H. E. Asbury, and Lewis W. Klahr. C. W. Asbury, while familiar with the manufacturing end, gives his attention principally to the marketing of the goods. His brother, H. E. Asbury, is superintendent of the factory and is to be credited largely with devising and putting into operation the system of management and costs, of which a description is to be given.

LINE OF GOODS MANUFACTURED.

The products of the Enterprise Mfg. Company show a wide diversity, ranging from simple goods, such as Meat Hooks or even the well-known Mrs. Potts' Sad Irons, to complicated machines represented by Power Mills and Meat Choppers, some of which are furnished with electric motors. Their assortment thus includes such articles as the following: Sausage Stuffers, Barrel Stands and Trucks, Beef Shavers, Cherry Stoners, a great assortment of Meat Cutters, Cobblers' Kits, Flag Holders, Tobacco Cutters, Measuring Faucets, Molasses Gates, Graters, Lawn Mowers, Lawn Sprinklers, Measuring Pumps, Mills

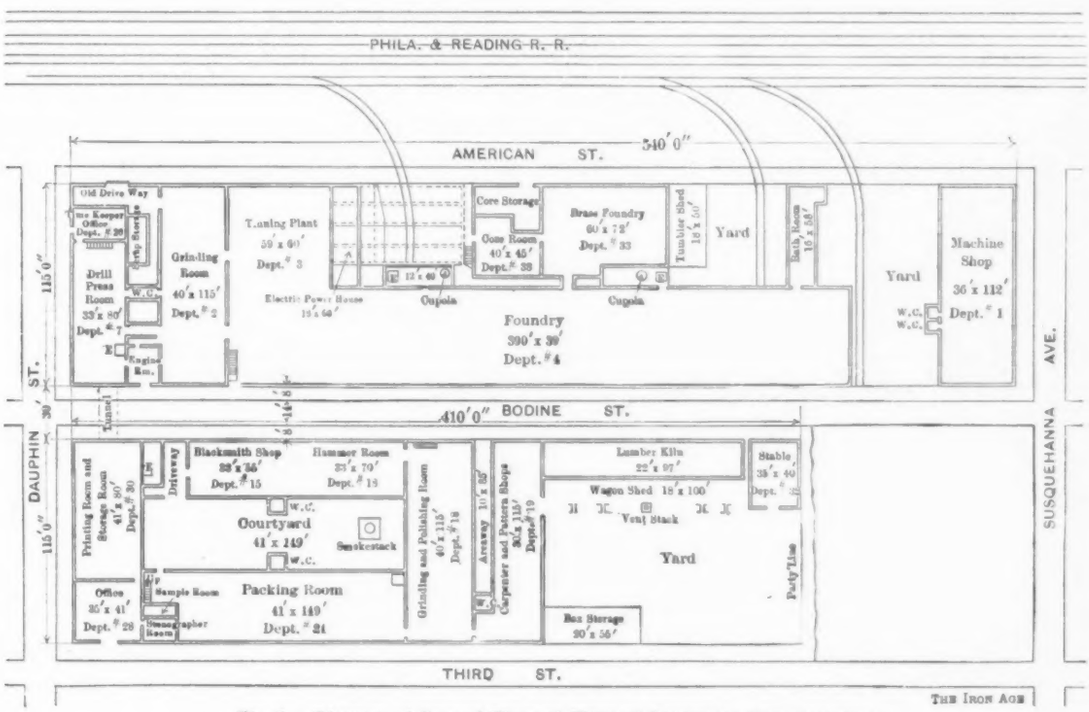

PHILA. & READING R. R.
AMERICAN ST.
540' 0"
Old Drive Way
Time Keeper Office Dept. # 20
Drill Press Room 33' x 80' Dept. # 7
Grinding Room 40' x 115' Dept. # 2
Engine Rm.
Turning Plant 39' x 60' Dept. # 3
Electric Power House 15' x 60'
Core Storage
Core Room 40' x 45' Dept. # 33
Brass Foundry 60' x 72' Dept. # 33
Tumbler Shed 18' x 30'
Yard
Bath Room 10' x 18'
Cupola
Cupola
Foundry 390' x 39' Dept. # 4
Machine Shop 36' x 112' Dept. # 1
W.C.
W.C.
115' 0"
ST.
AVE.
410' 0" BODINE ST.
DAUPHIN
SUSQUEHANNA
Printing Room and Storage Room 41' x 80' Dept. # 30
Driveway
Blacksmith Shop 28' x 36' Dept. # 15
Hammer Room 23' x 79' Dept. # 18
Courtyard 41' x 149'
Smokestack
Grinding and Polishing Room 40' x 115' Dept. # 18
Annex 10' x 68'
Carpenter and Pattern Shops 30' x 115' Dept. # 19
Lumber Kiln 22' x 97'
Wagon Shed 18' x 100'
Vent Stack
Stable 33' x 40' Dept. # 35
Yard
Party Line
Office 20' x 41' Dept. # 28
Sample Room
Stenographer Room
Packing Room 41' x 149' Dept. # 24
Box Storage 20' x 56'
THIRD ST.
THE IRON AGE

Fig. 1.—Diagram of Ground Floor of Plant of Enterprise Mfg. Company.

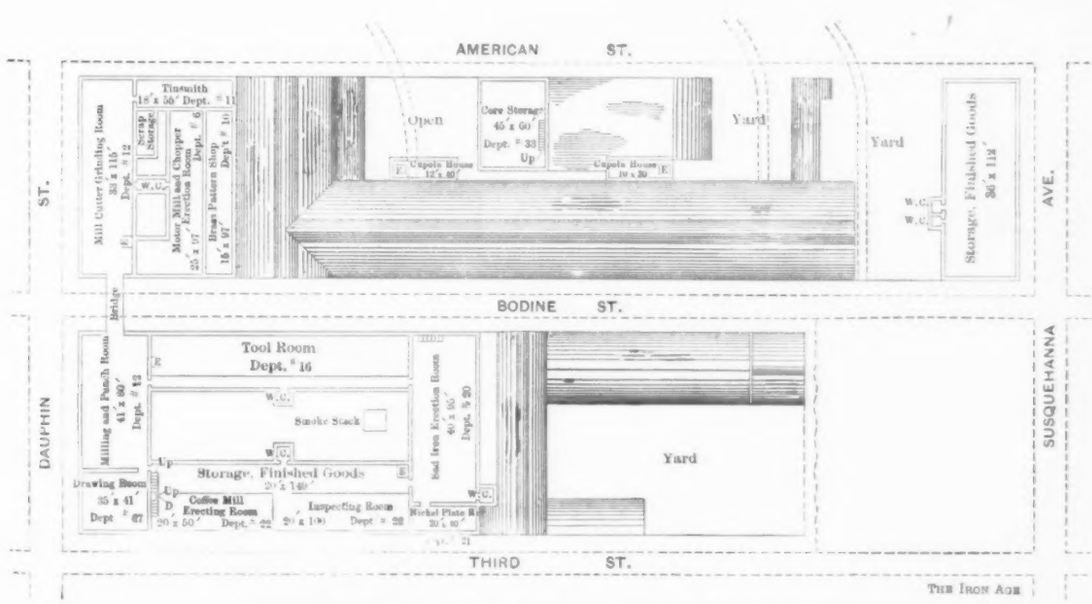

AMERICAN ST.
Tinsmith 18' x 56' Dept. # 11
Scrap Storage
Mill Cutter Grinding Room 35' x 115' Dept. # 12
Motor Mill and Chopper Erection Room Dept. # 6
Brass Pattern Shop Dept. # 10
Open
Core Storage 45' x 60' Dept. # 33 Up
Yard
Yard
Storage, Finished Goods 36' x 112'
W.C.
W.C.
ST.
AVE.
Capacity House 12' x 40'
Capacity House 10' x 30'
BODINE ST.
Bridge
Tool Room Dept. # 16
Milling and Punch Room 41' x 80' Dept. # 13
Smoke Stack
Rod Iron Erection Room 40' x 95' Dept. # 20
Storage, Finished Goods 20' x 140'
Yard
Drawing Room 35' x 41' Dept. # 27
Coffee Mill Erecting Room 20' x 50' Dept. # 22
Inspecting Room 20' x 100' Dept. # 23
Nickel Plate Room 20' x 40'
DAUPHIN
SUSQUEHANNA
THIRD ST.
THE IRON AGE

Fig. 2.—Diagram of Second Floor of Plant of Enterprise Mfg. Company.

in large variety, Mole Traps, Lard and other Presses, Ice Shredders, Raisin Seeders, Slaw Cutters and many other articles. Their product is of a high standard and almost universally known at home and abroad.

DIAGRAMS SHOWING ARRANGEMENT OF PLANT.

Most of these articles, it will be observed, originate in the foundry, but the finish which is given to them and the extent of other operations required in manufacture, makes the plant very diversified in its departments and thus rep-

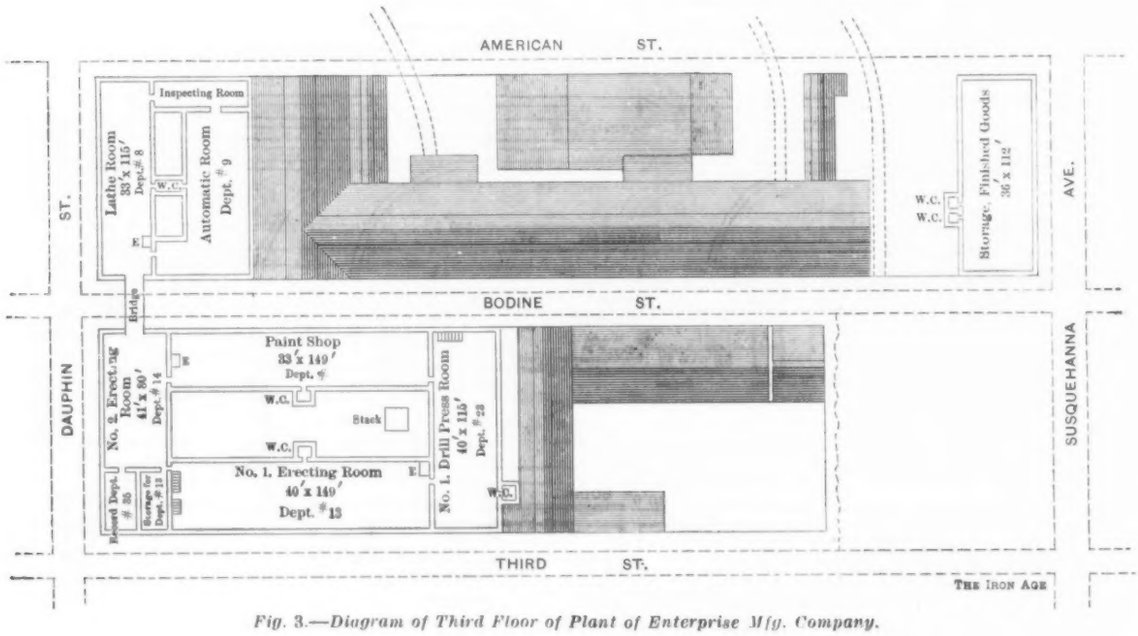


Fig. 3.—Diagram of Third Floor of Plant of Enterprise Mfg. Company.

resentative of manufacturing methods much more completely than are most Hardware factories. Diagrams showing the arrangement of the plant, which is situated on the block bounded by Third, Dauphin and American streets and Susquehanna avenue, are given herewith. Figs. 1, 2, 3 and 4, with designation of the various de-

Dept. 8. Lathe Room.
Dept. 9. Automatic Room.
Dept. 10. Brass Pattern Shop.
Dept. 11. Tinsmith.
Dept. 12. Milling and Punch Room.
Dept. 13. Erecting Room.
Dept. 14. No. 2 Erecting Room.
Dept. 15. Blacksmith Shop.
Dept. 16. Tool Room.
Dept. 17. Paint Shop.
Dept. 18. Hammer Room and Grinding and Polishing Room.
Dept. 19. Carpenter and Pattern Shops.
Dept. 20. Sad Iron Erection Room.
Dept. 21. Plating Department.
Dept. 22. Coffee Mill Erecting Room and Inspecting Room.
Dept. 23. Drill Press Room.
Dept. 24. Packing Room.

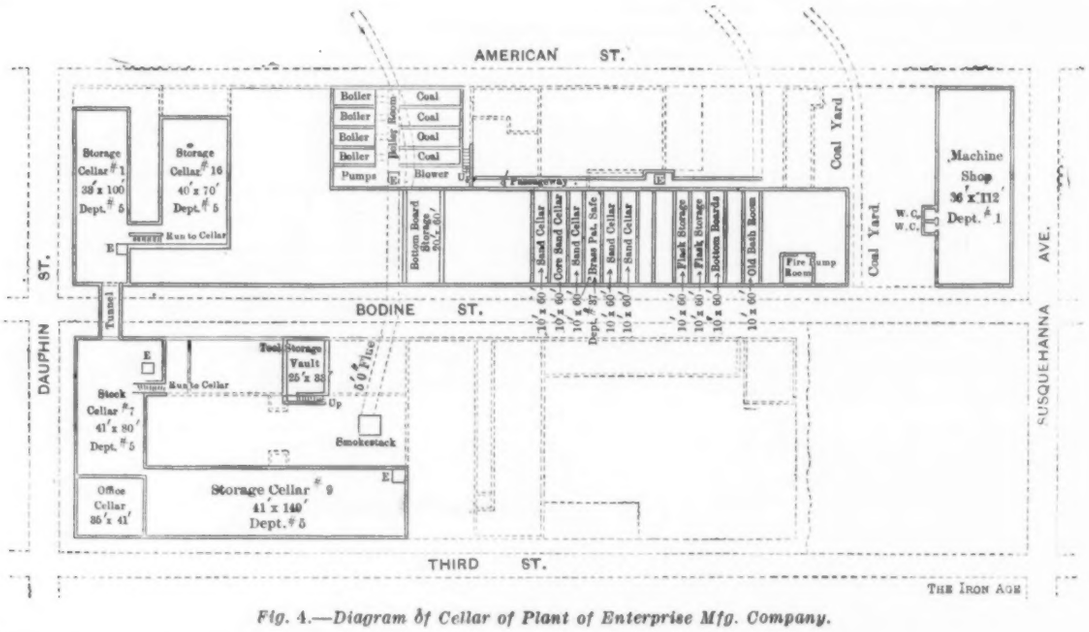


Fig. 4.—Diagram of Cellar of Plant of Enterprise Mfg. Company.

partments into which it is divided. As showing something of the organization of the plant, it is interesting to note that it is divided into the following departments:

Dept. 1. Machine Shop.
Dept. 2. Grinding Room.
Dept. 3. Tinning Plant.
Dept. 4. Foundry.
Dept. 5. Cellar Storage.
Dept. 6. Motor Mill & Chopper Erection Room.
Dept. 7. Drill Press Room.
Dept. 25. Shipping Department.
Dept. 26. Timekeeper's Office.
Dept. 27. Drawing Room.
Dept. 28. Main Office.
Dept. 29. Main Office Order Department.
Dept. 30. Printing Room and Storage Room.
Dept. 31. Boiler Room.
Dept. 32. Stable.
Dept. 33. Brass Foundry.
Dept. 34. Directors' Room.
Dept. 35. Record Department.

ISSUING OF STOCK ORDERS.

The number of each article required for a year's production is determined at a conference between the factory management and the commercial management, and a General Production Order is given to the engineering department, stating just how many of each complete article are wanted and when it will be necessary to have them finished. No regular form is used for such order, the engineering department simply making a list of the articles and their quantities required.

DESCRIPTIVE CARD— KEY TO SYSTEM.

In the engineering department is found a card index with specially ruled cards of stiff cardboard, 10 x 13 inches, for each complete article. One of these cards relating to No. 50 Sad Iron is reproduced herewith, Fig. 5. It will be observed that on this card are noted the name and number of the article in its different sizes, the name and number of each part, the material from which each part is made, its weight, quality, standard of gauge, the pattern number, the drawing numbers, if any, &c. Thus the following information is given in this card in regard to size 1 of Sad Iron, No. 50: that it is composed of the following parts: One bottom, one cap, two screws and one tin, and the part numbers of each; that the drawing in conformity with which it is made is D 321, which may be found for reference in the drawing file; that in the manufacture of this article it passes through the following departments:

No. 4. Foundry.
No. 5. Stock Cellar.
No. 18. Grinding and Polishing Department.
No. 20. Sad Iron Room.
No. 22. Inspecting Room.
No. 24. Packing Room.

SAD IRONS #50 SIZES 1-2-3 — Erecting Drawing No. — Finished in Dept. No. 20

Index Letter — Parts for one Machine — Usual Order

Name	No.	Drawing No.	No. Req'd	Dept. whence ordered	Pattern No.	Material	Wt. of Material	No. in Truck	No. of Master Pattern	Wt. of Sprue	
#1											
Bottom	1235	D-321	1	4-5-18-20-22-24	448	Cast Iron	3.9		5377 X	1.38	
Cap	1234	D-321	1		2085	Cast Iron	.67		5500 X	.75	
Screw	1237	D-321	2			Our #16 Special	.009				#16-20 O.H. ½" long
Tin	1238	D-321	1			14" x 20" I.C. Sheets	.007				1 Sheet cuts 60 pieces.
#2											
Bottom	1240	D-321	1		446	Cast Iron	4.7		5378 X	1.38	
Cap	1239	D-321	1		2012	Cast Iron	.4		5501 X	.75	
Screw	1237	D-321	2			Same as #1 Iron					Same as #1 Iron
Tin	1238	D-321	1			Same as #1 Iron					Same as #1 Iron
#3											
Bottom	1242	D-321	1		440	Cast Iron	5.06		5379 X	1.38	
Cap	1241	D-321	1		2013	Cast Iron	.5		5502 X	.75	
Screw	1237	D-321	2			Same as #1 Iron					Same as #1 Iron
Tin	1238	D-321	1			Same as #1 Iron					Same as #1 Iron
To Each Set 1 Handle 1 Stand											
See Cards For.											

Fig. 5.—Descriptive Card Which is the Official Record of Details of Construction of Each Article Manufactured and of its Various Parts. Size of Card, 10 by 13 Inches.

In addition to this information the pattern numbers are given and also description of the material used in each of the parts, the weight of such material, &c. In the blank column on the extreme right of the card a further note in regard to the screws used is given, and a memorandum made in regard to the tin, that one sheet cuts 60 pieces.

104 Sad Iron Bottom #50 Size 1 — Pattern No. 448 — Part No. 1235

Week Ending	Wanted	Made	Standing
1902 Aug. 5	5000	2670	
" 12	2800	2475	
" 19	2800	2175	
" 26	2800	2290	
Total	13400	9610	-3790
Sept. 2	2800	2745	
" 9	2800	3915	
" 16	2800	3825	
" 23	2800	3640	
" 30	2800	3725	
Total	27400	27460	+ 60
Oct. 7	2800	3245	
" 14	2800	2785	
" 21	2800	3300	

Sad Iron Bottom #50 Size 2 — Pattern No. 446 — Part No. 1240

Wanted	Made	Standing
5000	2935	
2800	2865	
2800	2705	
2800	2400	
13400	10905	-2495
2800	2785	
2800	2965	
2800	3020	
2800	2985	
2800	3105	
27400	25768	-1635
2800	2900	
2800	3015	
2800	3200	
2800	2645	
	37	

Sad Iron Bottom #50 Size 3 — Pattern No. 440 — Part No. 1242

Wanted	Made	Standing
5000	3015	
2800	2805	
2800	2965	
2800	3100	
13400	11885	-1515
2800	3025	
2800	2860	
2800	2700	
2800	2910	
2800	2670	
27400	26050	-1350
2800	2875	
2800	2985	
2800	3245	
2800	3100	

Fig. 6.—Department Production Book Kept in Each Department, Showing Number of Each Part Required Each Week. Size of Page, 9 by 14 Inches.

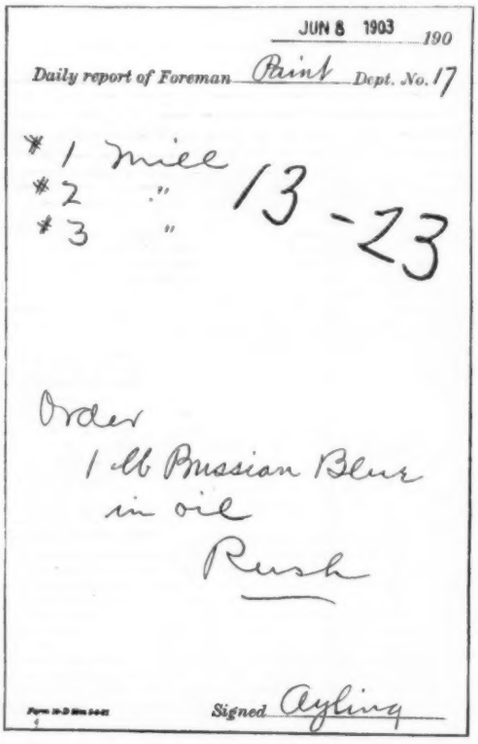
These descriptive cards are the key to the whole system of production, giving, as they do, the authoritative description of each part and designating the materials for all the parts of each article.

REQUISITION ON PURCHASING DEPARTMENT.

The engineering department, by reference to these descriptive cards, Fig. 5, ascertain exactly what materials are needed for the production of general or stock orders, and by sorting the materials into groups they are enabled

to issue requisitions on the purchasing department for all such materials, stating when they are wanted. The form of requisition used is represented below, Fig. 9.

These requisitions are made in duplicate, a copy being filed in the engineering department under the index letter of the material wanted. Ample time is given the


JUN 8 1903 190

Daily report of Foreman Paint Dept. No. 17

* 1 Mill
* 2 " 13-23
* 3 "

Order
1 lb Prussian Blue
in oil
Rush

Signed Ayling

Fig. 7.—Foreman's Daily Report, Showing Goods or Parts Required, with Marking in Record Department to Show Where the Delay Occurs. Size of Sheet, 5 by 8 Inches.

purchasing department to buy in the most favorable market or make contracts covering stated periods.

DEPARTMENT PRODUCTION BOOK.

After the purchasing department has ordered material necessary for the goods to be manufactured orders are issued to the various departments through the works for their make-up. For this purpose each department has a production book, Fig. 6, in which is noted by the engineering department just how many of each part are wanted each week or in stated quantities at stated times.

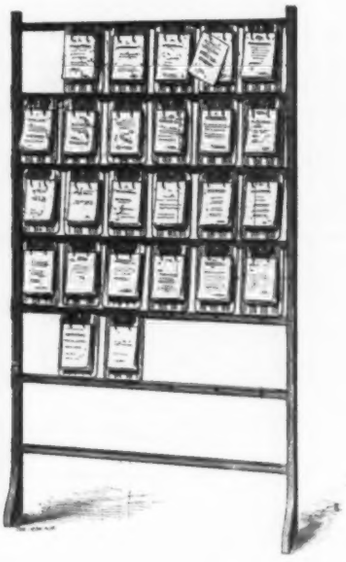


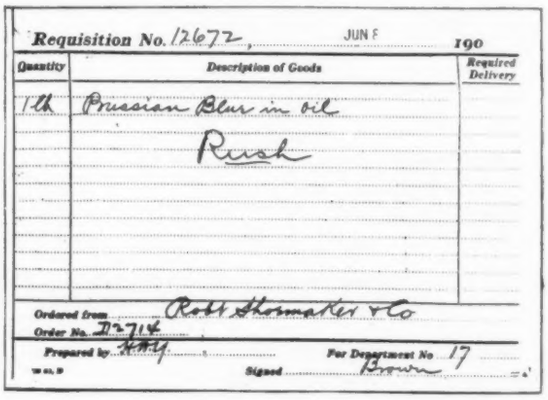
Fig. 8.—Bulletin in Record Department for Filing of Foremen's Reports Shown in Fig. 7.

The arrangement of this book is shown in the accompanying illustration, from which it will be seen that it is specially ruled and designates the name of the part, part number, pattern number and number of pieces wanted each week. Totals are made once a month, and plus or minus signs indicate whether the department is ahead or behind. The production book for the foundry department is made in advance of the other department books, so that the castings will be made and in the storeroom when called for by other departments.

The foreman of each department by reference to his production book knows what is expected each week in the production of parts, and if he falls behind his book one week he is supposed to make it up the next. He telephones the stock room or other departments for any parts or material wanted to produce these parts, and in case he is delayed in getting such parts or supplies notes the fact in his daily report described below.

FOREMAN'S DAILY REPORT.

The foreman of each department is required to submit a daily report to the record department, which states his shortages or anything else interfering with the work of his department. These reports are investigated by a clerk in the record department, who, by means of a tele-


Requisition No. 12672, JUN F 190

Quantity	Description of Goods	Required Delivery
1 lb	Prussian Blue in oil	
	Rush	

Ordered from Robt Shoemaker & Co
Order No. 12714
Prepared by Kelly
For Department No. 17
Signed Brown

Fig. 9.—Form of Requisition for Supplies Needed as Per Foreman's Report, Fig. 7. Size of Sheet, 5¼ by 7½ Inches.

phone message or a personal visit to other departments, straightens out the block. If unable to do so he reports the condition to the manager.

A sample of this daily department report is given in the accompanying illustration, Fig. 7. This report is from the paint department, No. 17, and indicates that mills Nos. 1, 2 and 3 are lacking to complete an order, and also that Prussian Blue is needed in a hurry. The Figs. 13 and 23, which are placed beside the numbers of the mills, are put on in red ink in the record department and indicate the numbers of the departments from which the mills in question should come and which are thus responsible for the block. In this way it is plainly indicated for the management precisely where delays occur.

These daily reports of the various departments are posted on a rack in the record department, as shown in the accompanying illustration, Fig. 8. There is thus brought together in convenient form for the manager's inspection a daily report of the condition of things throughout the plant. A carbon copy of this report is kept by each foreman for reference.

The manner in which the requisition for the purchase of the Prussian Blue, the want of which is reported on foreman's report, Fig. 7, is issued, is shown in the form given herewith, Fig. 9.

The next article will be devoted to a description in detail of the company's cost system.

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COPPER { SHEET ROD WIRE
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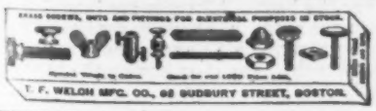

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